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THE SCIENTIFIC ORIGIN OF RELIGIOUS DOCTRINES.

I.—IMMORTAL LIFE.

BEFORE considering the way in which the doctrine of the immortality of the soul resulted from the study of observed facts, and therefore had a scientific origin, it will be well to touch briefly on certain considerations which influence men—with or without just reason—in maintaining this particular doctrine.

Most of us are trained from childhood upwards not only into full faith in a future and immortal life, but into the belief that in this faith there is comfort for all the ills to which mortal flesh is heir. The mere suggestion of doubt respecting the immortality of the soul is regarded as tending to deprive the world of hope and comfort. It is in connection with this faith that the dreary question has been asked, Is life worth living? and the answer given by most men to the question has been, Were this life all, it would not be worth while to live. Our English poet laureate has expressed the thought, when he says that if man's fight with Death be vain, and science proves we are but magnetic mockeries, cunning casts in clay,—

> Then
> What matters science unto men,
> At least to me? I would not stay.

Yet few who thus express and doubtless feel the sense of comfort in the hope of an immortal life ever consciously reflect on what they hope for. Few even have considered whether their faith in a future life is comforting for what it promises themselves or for what it promises in regard to others.

Many of honest mind, when asked whether there is much of comfort for them in the thought of an everlasting consciousness, including the clear recollection of all the events of this life, admit readily that such eternal remembrance would be infinitely painful. Even in this life, after a certain stage has been reached, most men feel that life would be scarce endurable but for the power we possess of diverting the mind from sorrowful reflections, and especially from brooding on the memory of those dear to us whom we have lost. We would not indeed forget such sorrows if we could; we even feel it to be a sacred duty from time to time to recall them vividly to remembrance: but were we to dwell constantly upon them, were they ever present in our minds so that we could not dismiss them, we should go mad. Yet what but ever-present consciousness of our whole earthly lives is promised, or threatened, by the faith in immortality?

If we view the immortal life as it relates to others, we quickly find reason not only to doubt how far faith in such life is really comforting, but also to question whether we have really entertained it so confidingly as we had imagined. If we cannot well conceive immortal life for ourselves without assuming that it includes conscious remembrance of all things that have happened in the earthly life, we are equally unable to imagine the immortal life of those dear to us without conceiving them conscious of all that takes place in our lives here. While as yet unwilling to ask our inner selves what we really believe and hope, we may hope that the spirits of departed dear ones will

> Be near us when we fade away,
> To point the term of human strife,
> And on the low dark verge of life
> The twilight of eternal day.

But while that human strife goes on, do we really believe that the dead whom we loved are near us, and know all that passes in our thoughts as well as all the actions of our life?

> Do we indeed desire the dead
> Should still be near us at our side?
> Is there no baseness we would hide?
> No inner vileness that we dread?

It has been said that did the Catholic really hold in his heart the faith he accepts with his reason and professes with his lips, his reason would stagger in the actual personal presence—as he believes he believes—of the God of the universe upon the altar before him. It may be said with equal truth (and it is a truth more easily grasped) that if men believed in their hearts that but one of those dead whom they loved through life were still, in some changed condition, conscious of their thoughts and actions, none but the innately vile could commit any evil action, however slight, or conceive any thought which a child might not confide to his mother, a son to his father, a husband to his wife. Would not the thought of each be that, if indeed

> The dead shall look us thro' and thro'—
> Shall he for whose applause I strove
> (I had such reverence for his blame)
> See with clear eye some hidden shame
> And I be lessened in his love?

Truly it would need no perfect faith in the supervision of all things by deity to make the believers in an immortal life refrain from every wrongful act, from every evil thought. There is scarce one among us who numbers not one at least among his dead, for whose sake he would be blameless in thought and deed, did he indeed believe, as so many of us suppose we believe, that the death of the body is but the beginning of an eternal spiritual life, in which those loved in the earthly life are loved still, and all that they do is known and cared for.

If, turning from definite thoughts of an immortal spiritual life, we consider only the vague faith in an unknown and mysterious hereafter, we find reason to fear that this faith, though it has been comforting to many, has been distressing to a much larger number of those who hold it. Do what men will to keep the faith vague, they cannot for the most part refrain from trying to picture it to themselves in detail. The natural wish to define a faith which has been made so large a part of most men's lives shows itself most strongly (as a rule) at the time when men first begin to recognise the possibility that death may be near at hand. As the actual moment of death draws near there is little power and little desire for definite thought; the brain grows weary as the moment for its final sleep draws near, and is content to accept vague comfort from those round the death-bed. But few who have had occasion to follow the thoughts of those dear to them during the progress of fatal illness have not been pained by anxious questionings addressed to those who have professed to teach with greatest confidence the doc-

XUM

trine of a future life. The faith which had been a vague comfort during active life, when its real significance was little thought of, the faith which as death actually approaches may again become vaguely comforting, is at this earlier stage of the close of life a source of distress and discomfort. Something of the feeling of anxiety expressed in the lines attributed to the dying Hadrian may be recognised in the thoughts of the dying ere yet the heavy hand of death is actually upon them :—

Animula vagula blandula
Hospes comesque corporis,
Quæ nunc abibis in loca?
Pallidula, rigida, nudula,
Nec (ut soles) dabis joca.*

But if such fears often attend the death of those who, though they have not really believed during life that after death comes judgment, and may come eternal tortures, have never reasoned out their unbelief, and in the weakness of mind which (always or nearly always) precedes death are moved by anxiety as vague as their past confidence had been, how much longer and more seriously have those suffered who have watched the deathbeds of those dear to them, feeling certain that the dying have by their lives condemned themselves to eternal punishment after death! If this were merely the creed (whether but professed or otherwise) of those whose whole care during life has been to tell other folk their duty, and to condemn the world in such sort as to gain credit with the foolish for superior virtue, it would not be worth considering. But alas! it is and has been the faith, and being the faith the fear, of tens of thousands of the really devout. Others than the evil—some who are akin to men's fancies of what angels might be—"believe and tremble," not for themselves, but for those dear to them whose faith is not as theirs, whose lives have not been all that these pure-souled ones believe to be essential to salvation. It is only the pulpit professors of religion who dare to repeat the monstrous untruth that the belief in a future life has on the whole brought comfort to devout believers. The best of the believers, those really earnest in their belief, refuse to be comforted by the thought of an eternity of future happiness for themselves, in their anxiety lest those dear to them should incur eternities of future torment, and still less in their certain conviction that some among those dear to them who have passed away must be punished for ever and for ever. Just in proportion as we recognise purity of heart and earnestness of devotion in those who possess fulness of faith, are we certain—we who have known and loved these simply believing single-hearted devotees—that they suffer anguish unspeakable at the thought of the probable future of many whom they love, the certain future of not a few for whose welfare in the next world they care more than for their own either in this world or the next.

The preachers who proclaim their conviction that belief in a future life has been a solace to the hearts of those who have loved and lost—to the parent sorrowing for the child, or child for parent, to spouse widowed of spouse, friend left lonely in the world for friend—either say they know not what or proclaim what they must know to be untrue. The pulpit preacher of comfort in the thought of the everlasting life is ready enough no doubt, beside the funeral baked meats, to speak idle words of comfort to parent or child, to wife or husband, to brother or to sister, of the dead who was so dear; but scarce are the words passed from his lips in which he tells the sorrowers that their dead have passed to a happier life, before he will proclaim to others his conviction that not eternal happiness but eternal misery must be the fate of most of us, of all who do not believe as he believes. It is those, however, who really believe who really suffer in the thought of all their belief implies; and were it not that, happily, their minds are not able to wholly grasp that thought, their whole lives, after even but one of those they loved had passed away under such conditions as would render eternal happiness doubtful or inconceivable, would be lives of misery. Nay, it seems to me that they scarce *could* live—or, at least, live sane; that they must either die or go mad, if it were not for some vague thought that it cannot really be as nevertheless their faith is ever telling them it must be. Possibly few among those who hold most earnestly the faith we are considering, and therefore feel most strongly that not to hold that faith is of itself a sin to be punished by all that that faith threatens, have perceived that did they accept all their faith teaches logically the heart would be moved to anguish so exquisite and so enduring that life or reason must give way.

* Pope, in a letter to Steele, comments on the opinion that these verses were trifling and unworthy of Hadrian's death-bed. The thoughts expressed by the dying emperor seem to him, he says, most natural and appropriate. Doubtless he was right. There is nothing of jest, though there is a humorous tenderness, closely akin to pathos, in Hadrian's last words. Yet for a poet Pope shows but slight appreciation of the essential quality of Hadrian's thought. He translates it, both in prose and verse, into something wholly different—into the expression of reflections which would be neither natural nor appropriate—since dying men are not apt to adopt artificial mental attitudes any more than artificially to pose their bodies. "Alas my soul!" runs Pope's prose translation, "thou pleasing companion of this body, thou fleeting thing that art now deserting it! Whither art thou flying? to what unknown scene? all trembling, fearful, and pensive? what now is become of thy former wit and humour? Thou shalt jest and be gay no more." Forty-eight words to represent twenty; or twenty-five if such words as "vagula," "pallidula," &c., be regarded as double! Yet the most characteristic idea of the original is not conveyed at all. Pope's translation of Hadrian's lines into poetry is better. Of course I am not referring to his well-known "Vital spark of heavenly flame!" which was written in response to Steele's suggestion that Pope should show how the dying Christian would address his soul, but to the lines :—

Ah fleeting spirit! wand'ring fire
That long hast warmed my tender breast,
Must thou no more this flame inspire?
No more a pleasing cheerful guest?
Whither, ah whither art thou flying?
To what dark undiscover'd shore?
Thou seem'st all trembling, shiv'ring, dying,
And Wit and Humour are no more.

Yet this version errs like the prose translation both in excess and defect. There are ideas in it which the original does not contain, while the characteristic idea of the original, the tender anxiety of the dying man for his soul after it shall have left the shelter of the body, is not conveyed. The seventh line is also singularly weak: the suggestion that the soul of a dying man seems to be dying is indeed a little worse than weak. Nor has the original a word about seeming. As for the last line, it does not correspond at all with the idea conveyed in the words, "Nec (ut soles) dabis joca."

A correct translation of Hadrian's verses must suggest something of their brevity, something of their quaintness, and something, also, of their roughness, all of which belong as much to the little poem as the idea, missed by Pope, that it is for the soul and not for the soul's host that pity and sorrow are to be expressed.

The lines might, I think, be fairly presented in some such way as this :—

Poor little wand'ring tender soul,
This body's friend and guest,
What places will you visit now?
Pale, cold, and naked little waif,
Unwilling now (as once) to jest.

Even this is redundant, and a more accurate translation, which, though rough, is not perhaps much rougher or quainter than the original, might run :—

Wand'ring tender ghostie!
Body's friend and guest,
What places seek you now?—
Pale, shivering, stript,
Nor as of yore wilt jest.

Compared with the misery which the tenderest and truest men and women have suffered, and must suffer, at the thought of some at least among their lost dear ones enduring an eternal life of suffering (or were it even but the loss of the eternity of happiness of which their faith assures them), the cruelties which men have inflicted on their kind because of faith in the doctrine of everlasting life, may be regarded (terrible though they have been) as adding relatively but little to the sum-total of misery which the doctrine—be it true or false—has assuredly entailed upon the human race. Moreover, the contemplation of man's cruelty to man in the holy name of religion tends to wrath rather than to sorrow. Therefore I will leave such considerations here untouched.

ENGLISH PRONUNCIATION.

(*Concluded from p.* 198.)

THE passage in "As You Like It," where Celia ridicules Le Beau's pronunciation, "spot" for "sport," suggests not only that in Shakespeare's time the "r" was rolled, but also that the pronunciation of the "o" was then more nearly like our "u" in "but," or that "spot" was pronounced "spoot," and "sport" "spoort." For there is now a marked difference between the vowel sounds in the words "spot" and "sport," whereas, Celia's play on the words suggests that, but for the "r" lost in Le Beau's affected pronunciation the words had the same sound. There is, indeed, reason for supposing that as "a" in old times was "ah," and "e" was our "a" (as in fate), so "o" was more nearly our "u." Thus we find Constance saying:

O lawful let it be
That I have room with Rome to curse awhile.

In old Scottish writing our word "but" appears nearly always "bot." The pronunciation "gould" for "gold" is even yet heard in many parts of England, and is common in Ireland and Scotland. And the "u" sound in such words as "shoe," "London," &c., serves to show that "o" was regarded of old as representing this sound. (Observe that this being so, the "u" sound in "London" is not a modern corruption).

On the other hand, there is no reason for supposing that "u" originally represented the sound of "iu" or "yu" given to it now. The pronunciations "dook" for "duke," instead of "dyook," and "Toosday" for "Tyoosday," should be regarded rather as archaisms than as vulgarisms.

We have already seen that diphthongs like "ea" in English, "ai" in French and the various combinations used at different stages of the progress of a language as spoken and written, give useful information as to the force of the simple vowels in past times. As steady changes have taken place in this respect, we can not always be quite certain as to the force of a simple vowel at any given time, or even of a diphthong, though the latter is usually a much easier matter. For instance, old Pepys spells the word "skate" (not the fish, which, so far as I know, is not mentioned in his diary) in both the forms, "skate" and "skeat." We can infer from this that in his time "a" had already lost the "ah" sound, since "skeat" cannot possibly represent the sound "skaht," while "ea" still represented the sound of "a" in fate. But we know that long after Pepys' time the proper sound for "a" was regarded as "ah." The first letter of the alphabet was even called "ah" till a much later time in England, and is still so called in Ireland, B being distinguished in sound by being called "ahrr"—justifying the name given it by the nurse in "Romeo and Juliet"—"the dog's letter."

Let us consider another diphthong, "ei." If this is dealt with according to the known sounds of "e" and "i" in long past times, we see that it represented the sound which we should now write "aee" given as a diphthong. Here we recognise the justice of the rule suggested at the outset, that the further we go from the parent stem the more likely we are to find the older pronunciations adhered to. The Englishman says "eyether" and "neyether," the American says "eether" and "neether," which is decidedly nearer the old sound. But when the Irishman was asked: "Do you say 'neyether' or 'neether,'" he answered, "I say 'nayther,'" an answer doubly true. For it tells the Irishman's practice, and it indicates what really is the true pronunciation of the word, if old fashion is to be followed. Moreover, though it would decidedly be a solecism now to say "ayther," yet the knowledge that this is the true pronunciation is useful, as helping to show the origin of the word from the old Saxon "aegther" contracted from "aegh-wæther" *i.e.* "each-whether." (In passing we note that, according to the interpretation we have found already for "ea," "each" would be properly pronounced "aytch," by which the connection existing between "either" and "each" is clearly enough indicated—I mean, by noting that they were sounded "aytch" and "ayther." This connection is not lost in the American pronunciation, but it is entirely lost when we pronounce the words as in England "eetch" and "eyether.")

One of the strangest features of our English speech to Americans is the pronunciation of such words as "Derby," "Hertford," "clerk," &c., "Darby," "Hartford," "clark," and so forth. Here both countries have changed their modes of pronunciation, but in opposite directions (I refer to the more usual American pronunciation of such words, for in New England we not unfrequently hear "clark," &c., as in the old country). There can be no doubt that the original pronunciation of "clerk" was like that given still to the word "clerc" in France. For we are certain that the word is of French origin, and we are equally certain that its pronunciation in France, always represented by the same vowel letter, has changed very little, if at all. The word then of old was pronounced "clairk"—as we should now write the sound. "Clerk," no doubt, represented that sound rightly enough of old. In Scotland this is the way the word is actually pronounced, often even by the educated, though they recognise that in Great Britain at any rate custom requires the sound "clark." In England the correct intermediate sound "clairk" gradually changed towards "clark" till this usage became established. In America the spelling of the word seems to have regulated the pronunciation, at first, among the educated, from whom (as was natural in colonial communities) the rest took their pronunciation. Hence, as the force of "e" in spelling gradually changed to its present "er," or short "u," value, "clerk," pronounced "clairk," gradually changed to "clurk." But the proper name spelled and pronounced Clark, Clarke, &c., shows in America as in England how usage long since established the English pronunciation of the word. So does the American spelling of the name "Hartford." Here the influence of teaching could not, as in the case of the scholarly "clerk," bring the general body of the community to say "Hurtford," for men never willingly alter the pronunciation of old home-place names. So, as the mountain would not come to Mohamed—"the proverb is something musty"—they altered the spelling to correspond with the common pronunciation, since the common pronunciation would not conform itself to the spelling. Yet Americans should not allow the spelling, "Hartford," to destroy re-

XUM

membrance of the fact that Hartford, of Connecticut, was named after old Hertford, in England.

Many words regarded as Americanisms, and in one sense very properly so, are in danger of losing the evidence of their old English origin through the changes of sound that have come over our simple and diphthongal vowels. For example, consider the words "peart" and "slick." These are commonly regarded as provincial English in origin, and as Americanisms because they are apt to be heard all over America and to be used by classes which in England do not use these words even in the very districts where they are commonly used by the working orders. In reality, these words are simply "pert" and "sleek" differently pronounced. Analysing them according to the rules we have recognised, we see that neither "pert" nor "peart" can be the original pronunciation of the word "pert." "Slick" and "sleek" are both very near to the old pronunciation of "sleek," probably "slick" the nearer of the two. (We have in the Danish "slikke," in Icelandic *slikr*.) As for "pert" it is derived from the old French "apert," still existing in combination in the word *malapert* (which shows, by the way, that originally the word "pert" implied no rudeness or impertinence). Therefore, the original sound was "pairt"—as we should now spell it. This would be represented in old times by "peart"; and, indeed, we find Sir Philip Sidney spelling the word "pearte," writing of "pearte boldness" (not, be it noticed, simply "peartness" as he would if the word "pert" alone had had in his day an unpleasant significance). It was also written "peert," just as "great" is written "greet" in the passage quoted near the beginning of this essay. But with the known force of "ea" and "ee" in old times, each spelling assures us that the original pronunciation of the word was "pairt," and that the "pert," "peart," and "peert" of to-day are one and the same word, all of them more or less corrupt in pronunciation.

Before leaving the English vowels, about whose sounds, however, a volume might be written and thousands of curious examples produced, I must note one or two usages which, at a first hearing, seem (to Englishmen at any rate) peculiar.

Take first the "a" in "bath" and such words, which Westerners are so tickled by when they hear it from an English mouth. The true English sound is "bahth," not as too often rendered in America (by an exaggeration of our method) "bawth." Now, this is nearer the old pronunciation than "bath" with the "a" as in "fat." The New Englander who says (not that all do) "mahn" for "man" is probably nearer the old sound than the Englishman who says "man"; but the Westerner has departed from old usage still farther when he says "bath" with the "a" as in "bat."

In America the country folk mostly say "wrastle" for "wrestle." Here both the English and the country American pronunciation are corrupt; though, of course, no educated man can say anything but "wrestle." "I would have told you," says Le Beau in "As You Like It" (folio edition), "of good wrastling"—and "wrastle" it is all through, whether the Beau, or Celia, or Rosalind, the Duke, Orlando, or Charles the Wrastler himself, uses the word. But how was the word pronounced? It could not possibly have been "wrestle," as we say it. It might have been either with the "a" as in "fat," "fate," or "far," "wrassel," "wraystle," or "wrahstle." Probably the word was pronounced "wraystle," which would be correctly represented in Shakespeare's time by "wrastle," and a little later by "wrestle" (now representing a different sound). The old Saxon verb was "wraestlian"; that origin, as well as usage in regard to vowel letters, would indicate this pronunciation. The American and country English pronunciation are obviously nearer the old form than our modern English and the cultured American usage.

I have mentioned an American way of pronouncing the word "very." It chances that this was the first Americanism I ever noticed, and I noticed it rather early in my American experience. I had had but one conversation with an American, on business, in which I had noticed no difference, unless the careful pronunciation "afterwards" for our clipped English "afterw'ds" could be called such, when, on Friday, October 2, 1873, I travelled from London to Liverpool in the same carriage with an American lady and gentleman. At Euston the gentleman asked his wife some question about his luggage; the answer, "I'm not vuhry sure," introduced to my notice the pronunciation I refer to. ("Vuhry" does not represent the exact sound; the vowel tone is correctly represented by the "u" in "fur," but there is a curious rest on the first syllable, which gives the "u" sound a little more stress than it has, for example—in the word "furry.") In England, of course, "very" rhymes perfectly with "merry." But the English pronunciation is certainly a corruption. The word was indeed formerly written "verri" as well as "veray," and in the French *vrai* we have evidence of a sound nearer to our English "very" than to the Americanism we are considering. But the original French word was "verai," and the Latin "verus" indicates the proper pronunciation of the "e" as in the modern Italian "ver" ("e" like "a" in "fate"). The Scotch in their "vara" are not quite right, neither are we in England. Nor is the Americanism right. The incorrupt pronunciation which, however, would by no means be correct now, would make "very" rhyme very nearly with "fairy."*

And now a word or two on the consonants. It might seem that they can undergo little change—a "t" is a "t" wherever the English language is spoken, nay all the world over. It may be altered into a "d" or into "th," but it is not of such alterations that I am here chiefly speaking. Rather I am trying to show that the actual force of particular letters has changed. It seems at first sight impossible that consonantal letters can have altered in their actual force as we have seen that vowels have. Yet not a few of our consonants have altered in this manner. Take first our old friend the letter "h." I am not about to dwell on the special English misuse of this letter, which, indeed, I considered fully about two years since in the pages of the *Atlantic Monthly*. I am proposing to show what many, I believe, will be somewhat surprised to learn, that the letter "h" originally represented more than a mere aspirate. The English race began to misuse the "h" long before they began to drop their aspirates and to throw aspirates in where they are not wanted. Consider first the very name given of old to this letter and still used, though its significance has long since passed away. We call the letter "aitch." Every other consonant is called by a name which includes the force of the letter, and no other consonantal force whatever. In the name of "h" alone there is a consonantal force which is more than the letter itself, however fully aspirated or even exaspirated, ever has in our mouths. Is there not some evidence here that "h" formerly had a similar force?

We may here pause a moment to ask if the letter were always so called, or if the name given to it, though similarly

* One of the oddest of all the vowel changes I have ever heard of has recently come under my notice. I had long observed that uncultured persons in America spoke of Eyetalians for Italians; Rooshans (like Mrs. Gamp) for Russians, and so forth; but that our old familiar Louisa should be pronounced Lou-eye-sar was, I must admit, a new and painful experience.

spelled, were similarly pronounced. We have curious evidence on this point in "Much Ado About Nothing." "By my troth," says Beatrice, "I am exceeding ill. Heigh-ho." "For a hawke, a horse, or a husband?" asks Margaret. "For the letter that begins them all, h," that is, for an "ache"—heartache, as Margaret presently hints, when she says, "God send every one their heart's desire." Now we know that the word "ache" was formerly not always pronounced "ake," but often "aitch"—or at any rate in such a way that "aches" was a dissyllable. For while we have in the folio (our best guide in such matters) Othello saying, "Smell'st so sweet that the sense akes at thee," we have in "The Tempest," "Fill all thy bones with aches"—and other examples attesting a variable pronunciation. (The elder Kean, following, it is said, Charles Kemble, pronounced "ache" invariably "aitch." But be this as it may, Beatrice's remark assures us that there was a consonantal force in the name of the letter "h." Indeed, the very circumstance that "h" appears in the name "ache" is significant both as to the original pronunciation of the word and as to the original force of the letter. There is no trace of aspiration in the word "ache" as we pronounce it; but also there is no trace of the present force of "h" (or rather its want of consonantal force) either in "ache" pronounced "aitch," or in such words as character, chagrin, or architect. The variability of the present force of "ch," combined with the entire absence of any aspiration in pronouncing any form of the compound letter, shows that originally "h" represented more than a mere aspiration, and probably represented more than one consonantal effect.

Hence we can understand what otherwise seems so singular, that our "hard" is regarded by philologists as akin to the Greek *kratos* or *kartos*, strength; that "horny" and "corny" are akin; that, conversely, our "garden" (which is the Saxon "geard" and the old English garth, etymologically identical also with "yard"), is from the same Aryan source as the Latin *hortus* and the Greek *chortos*, an inclosed place for feeding. In the last word, resembling the French form, *jardin*, we find h, g, y, j, ch, all doing duty in turn—which affords tolerably clear proof that "h" had originally more than mere aspirational force, though it shows also that the force of the letter was variable and unstable.

Here, however, we are confronted by the fact that in old Saxon words which afterwards had a decidedly guttural pronunciation, and which are to this day spelled in such a way as to show how they must formerly have been pronounced, "h" does duty for the guttural. Thus, our "light" and "sight" were in old Saxon "liht" (or "leoht") and "siht." It is certain the "h" had some meaning here, equally certain that up to the fifteenth century these words had a guttural pronunciation; and it is incredible (as contrary to the spirit of English language changes) that a guttural should have replaced some lighter and easier pronunciation, represented by the "h" in "light" and "sight."

We can understand, also, when we recognise the consonantal force given to the letter "h" of old, the singular combination "hw" constantly used in Saxon where we write "wh." Thus "hwil" represented our "while," and "who, which, what, when, why," &c., were respectively "hwa, hwilc, hwæt, hwænne, hwi," &c. The corresponding words in Latin began with "qu," representing probably the sound "chw" ("ch" guttural) rather than "kw." We retain only the "w" sound, having almost lost in England even the aspirate part of "wh"; the French retain only the "k" sound, to which the Italian "ch" is now equivalent, though probably once guttural. In Scotland the full consonantal sounds were long retained in the old forms "quhile," "quha," which probably resembled very closely in pronunciation the Saxon way of pronouncing "hwil," "hwa," &c.

Much might be said about the letter "h" as it now appears in such combinations as "th," "ph," &c. There is abundant evidence that the two sounds now represented by "th," as in "thought" and "that," are really corruptions of sounds correctly represented by "t" aspirated and by "d" aspirated respectively. These sounds are still retained in parts of Ireland.

Our modern "j" again is a corruption of a sound nearly akin to the consonantal "y."

The changes which have affected the letters "l" and "r," as shown by many passages in old plays (for instance, in the play on the words "Walter" and "water," in Henry VI., part 2, act 4, sc. 1), are well worth studying by those who wish to form some idea of the way in which our mother tongue was probably spoken by our forefathers, and in particular by those among our forefathers to whom we owe the parentage of English literature.

But for the present—*sat prata biberunt.*

COLOURS OF ANIMALS AND FLOWERS.

I WAS watching not long ago the behaviour of a chameleon in the midst of the bright green leaves of ivy (of the kind sometimes called railroad ivy) in a Florida garden. The lizard (Dendrosaur, if the lovers of long words prefer it) was so nearly of the same colour as the surrounding leaves that my eye could detect no difference, though I have a keen sense of colour differences. While I watched, two events took place, each of which illustrated the value of the chameleon's then displayed colouring. A small fly, itself somewhat resembling in colour the ivy leaves, but as it appeared not sufficiently so for safety, settled on a neighbouring leaf. In an instant the tongue of the chameleon was protruded and withdrawn, so quickly that the motion could hardly be detected; but after the movement the fly was no longer on the leaf, nor had he flown away. The chameleon seemed to know where that fly was, for one of its globular eyes, which had for a moment only been directed on the fly, was turned towards myself with a look which seemed to say in chameleon language, "I had him there," the whole aspect of the lizard showing that he still had him. A few moments later the gardener approached, whom the chameleon seemed to know better than it trusted him, for it slipped away among the leaves so deftly that the eye could barely follow its movements. (It must not be inferred that the gardener had made attempts on that lizard's life; on the contrary he valued the chameleon for his services; but he had often disturbed it by watering the plants on which it rested, and this was an indignity which that little Dendrosaur resented.) A few minutes after, the gardener having retreated, the chameleon was on one of the sticks supporting the garden ivy, and there it gradually assumed the same colour, so far harmonising with the stick that he seemed only an excrescence upon it, not a live creature which a short time before had been light green in colour.

Among the various developments—protective, destructive, or simply attractive—observed in animals and plants, few are more interesting than colour. Let us consider a few illustrations of the various forms in which colour affects the development of life.

Consider the striped tiger, on the one hand, as an example of colour in an animal which lives by preying on others, and the zebra, on the other hand, as an example of colour

in an animal whose life depends on its not becoming the prey of carnivorous animals. We can understand how, in certain regions, those members of feline races who chanced to have markings on their bodies which corresponded in appearance with the stems of trees, or with jungle reeds, and the like, would be better able to remain concealed till the animals which formed their prey came within range of their spring, and so would have the best chances of living—for carnivorous propensities have their life-supporting as well as their life-destroying aspect. And in like manner, although the zebra is chiefly protected from carnivorous enemies by his almost unrivalled speed, yet the zebra has his occasions for rest and sleep, and it is manifestly to his advantage, when sleeping in the shade of trees, to have markings on his body which from a distance would be confounded with the stems of trees and shrubs beneath which for awhile his active limbs were at rest. For so would he best escape the attacks of animals of prey.

It is noteworthy that when the zebra is stretched on the ground the stripes on his legs as well as those on his body are vertical as seen from a distance. The same is the case with the tiger's stripes when the animal is couched for a spring.

We can understand then how in the course of many generations the tiger would develop his stripes to aid him in attack, and the zebra develop his to give him safety —for the less striped of either race would have the worst chances in life's struggle, and so be steadily eliminated from the stock—as surely (in the long run) though not as uniformly as the inferior members of flocks and herds are removed by the breeder. In like manner and to like advantage, the leopard and the jaguar have their spots, simulating the spotted shade of leaf-bearing trees, the lion has his sand-hued body, the antelope (besides his speed) his colour akin to the surface over which he urges his course, and so forth. Some animals even change in colour with the season, or are modified according to habits; for instance, the alpine ptarmigan is white in winter, and the red grouse resembles in colour the heather; leaf-eating insects are green; those which feed on the bark are grey, or brown, or mottled.

Apart from the interest which such cases have in themselves (to mention only these few, and not the thousands whose mere names would fill all the space available to me), there is singular, to me impressive, interest in the evidence which these characteristic colours and markings carry with them, even through untold ages, of their origin and persistence. Only a few minutes ago there passed across the porch outside my study window a sandy-coloured cat marked with stripes such as hundreds of thousands of years ago were of value to its remote ancestors in the struggle for life. But though it is wonderful to see such a feature as this handed down through generation after generation after the time when they were of essential use in the struggle for life, there is something to me even more impressive in the latent continuance of such characteristics. A few minutes ago I saw ploughing a field of mine a mule, round whose legs, near the joints which we call the knees in the forelegs and the hocks in the hind legs (really corresponding to the wrists and heels of man), are seven or eight rings precisely corresponding to the rings round the corresponding parts of his remote ancestor, the zebra. Through thousands of generations, in the horse and the ass, these stripes have as it were remained dormant—though for aught I know they may have occasionally shown themselves in particular individuals, even as in particular men special monkey or ape-like traits may show themselves. But, as we know, such markings are so exceptional among horses and among asses that the animals showing them are regarded almost as monstrosities. Yet *there* has been lying in wait in the blood of both races, during hundreds of thousands of years, this particular trait of the wild ancestral race, ready to show itself when the two descended races should be crossed. The case is akin to the appearance, when breeds of fancy pigeons are crossed, of young which are scarcely to be distinguished from the wild ancestral rock-pigeon; but in one case we can trace back the line on either side to the blue rock-pigeons through a limited range of removals. In the other we have the immense range of time to deal with which separates the branching off of the equine and asinine stocks out of that particular family of hippic animals from which the descent of both began.

The colouring of animals is not always of this simply protective character, however, though always (so far as can be judged) playing an important part in developments. There are some cases in which it has been found difficult, even impossible, to account for the difference which undoubtedly exists in regard to the struggle for life between animals of the same class differently coloured. In the human race itself we find races of different colour affected in different degrees by specific diseases. "The colour of the skin," says Darwin, "is sometimes correlated in a surprising manner with a complete immunity from the action of certain vegetable poisons, and from the attacks of certain parasites. Negroes and mulattoes are almost entirely exempt from yellow fever and from the intermittent fevers which prevail along the shores of Africa. The susceptibility of animals to the attacks of insects is found to be correlated with colour. So also is the liability to be poisoned by particular plants." Professor Wyman informed Darwin that the farmers in Virginia found only black pigs capable of resisting the effects of paint root. White sheep and pigs are injured by plants on which the darker-coloured animals can feed with impunity. Hundreds of such cases could be cited.

In another respect colour plays an important part, viz., in influencing sexual selection. It is not as yet easy to say in some cases whether this or some protective or concealing influence is really in question. Thus, as Darwin remarks, the colour of the green woodpecker seems "a beautiful adaptation to conceal this tree-frequenting animal from its enemies;" but we know that there are many black and pied varieties, so that he concludes that "the colour is probably due in chief part to sexual selection." It does not seem clear that in this particular case the latter interpretation is forced upon us—since most of the pied varieties seem as well protected by their colour as the green; and, in fact, we find them for the most part frequenting trees whose bark or foliage harmonises with their own prevailing tints. Moreover, we have already seen that the insects on which woodpeckers live, including leaf-eaters and bark-feeders, are diversely coloured to correspond with these special habits. Why should not the same variety be found among the birds which seek them? Even the red-headed woodpecker is not quite certainly to be regarded as an exception; still in his case sexual selection seems to be the explanation naturally suggested. In many cases there can be no doubt that peculiarities of colour in animals of various kinds have been developed mainly in virtue of natural selection, or have at least been carried far beyond the requirements of mere protection.

In the vegetable world colour seems to be in all cases dependent on the requirements of propagation. Thus where seeds are diffused by animals, as with the berries, we find the fruits brightly coloured to attract the attention of the animal distributors. It may be noticed that where seeds are distributed by the winds bright colours are not found in the fruit, even though the plant be closely allied to species

where the bright colours are present (the distribution being effected by animals).

The colours of flowers have been shown by the researches of Sprengel, Fritz, Hermann, Miller, Darwin, Lubbock, and Wallace to be necessary (or rather to have become necessary) for the attraction of certain species of insects by which the pollen may be transferred from the stamens (of one flower) to the pistil (of another) and (cross) fertilisation effected. Mr. Grant Allen, in his charming little book on the "Colours of Flowers," has advanced and supported by very striking evidence the interesting theory that the colours of flowers range in order of development: 1. From white found in flowers "which lay themselves open for fertilisation by miscellaneous small flies;" 2. to yellow found in flowers which depend on small beetles; and 3. to red, purple, lilac, and blue found in flowers "which specially bid for the favour of bees and butterflies." Blue seems to be the highest development of all; but in cases of retrogression we find the direction of change altered. In other cases, where night insects are to do the work of fertilisation, we find white, not as a token of inferiority or degeneration, but as the most suitable colour for that special purpose. Some flowers, fortunately few in number, have a livid red colour resembling that of dead meat, by which (as by their unpleasant odour) they attract the admiring attention of flesh flies.

Luckily, as Sir J. Lubbock notes, and has proved, the tastes of bees and butterflies, the most important among the fertilisers, are akin to ours, not only as to odour and taste, but as to colour; otherwise we may be sure flowers could neither smell so sweetly nor be so beautifully coloured as most of them are, nor secrete so pleasant a product as that from which bees make their honey.

AMERICANISMS.

FARMER JOHN'S SOLILOQUY.

[THIS little poem is worth careful study, as an example of the use of Americanisms in association with true poetry. The expressions seem vulgar and commonplace to English ears, but the language is that of a class, and is not exaggerated or coarsened. Humour and pathos are as effectively combined as in Carleton's ballads.]

1.

I mout as well acknowledge, 'taint no use o' beatin' round,
I've done a heap o' thinkin', plowin' up this faller ground,
An' suthin's been a painin' an' achin' me like sin—
I reckoned 'twas dyspepsy or malary creepin' in.

2.

At last I got my dander up, an' to myself, sez I,
The biggest fool in natur's him that tells hisself a lie:
I've been lettin' on 'tis malary, an' my stummick, when I know
It's my conscience that's a hurtin' an' worryin' me so.

3.

I've been a shirkin' this here thing for thirty year or more,
An' I orto had this shakin' up an' settlin' down afore.
I've been honest fur as payin' goes, not a penny do I owe,
But the kind o' cheatin' that I done, was the kind that didn't show.

4.

My mind goes back to Hanner, when I fetched her here a bride;
No apple-bloom was sweeter, an' she nussled to my side
Like she thought she had a right to, an' could trust me without fear
For the love I never hinted at for more'n thirty year.

5.

There was churnin', bakin', bilin', there was nussin' an' the rest,
From long afore the sun riz 'till he slumbered in the west,
An' when the rest of us was done, an' lollin' round on cheers,
Hanner was recuperatin' with her needle an' her shears.

6.

But when the life was ebbin' from that faithful, patient heart,
I had to face the music—I hadn't done my part;
And I couldn't help a thinkin', watchin' out that weary life,
That there's other ways o' killin' 'xcept a pistol or a knife.

7.

It sounds like sacreligion, but I knew jist what she meant
As I whispered, "Fly to meet me when my airthly life is spent"—
"I'm tired, John, so tired, but I've allus done my best,
An' I may feel more like flyin' when I've had a spell o' rest."

THE DONNELLY CIPHER DECIPHERED.

MANY seem to be impressed with the array of figures advanced by Mr. Donnelly in support of his preposterous cipher system, and supposed to represent the chances against his results being casual. Now that he has disclosed his secret, as he absurdly calls it, giving the key-number of his cipher, the problem is supposed to be reduced to one of probabilities; and although the full value of the odds as he presents them may be regarded as questionable, yet those who are ignorant of the laws of probability imagine that a certain portion of those odds must still exist in favour of the reality of his cryptogram, and a very small proportion would still amount to an overwhelming balance of probabilities.

As a matter of fact, Mr. Donnelly's discussion of the question of chances shows that he is utterly ignorant of the laws of probability. He claims odds in favour of his cryptogram which are absolutely unreal and imaginary. He adds and multiplies these imaginary chances in ways which impress the ignorant (and those ignorant of chance laws are many) with the idea that he is making out a strong case, but impress those who know the laws of probability with the sense of the amazing presumption of the man in pretending to touch weapons of whose use he is absolutely ignorant. That the man who could not understand Bacon's five-letter cipher, even after he had read Bacon's sufficiently lucid account of it, should claim to have discovered and interpreted a cipher which, according to his own account, Bacon had very carefully concealed, was preposterous enough. But that a man whose every remark about the laws of chance shows that he knows nothing about them should claim to urge the calculation of chances in favour of his foolish cipher-theory, is a still more stupendous example of

that blind conceit which crass ignorance alone is capable of begetting.

But now that Mr. Donnelly has been pushed to disclose his key-number 836, he has out-Heroded his own Herodian nonsense (slaughtering those innocents, the laws of arithmetic). He positively attempts to make the final proof of the absurdity of his cryptogram a proof decisive of its validity.

If he had in some way, independent of foregone conclusions, detected the number 836 as a key-number, and thence deduced his five cipher numbers with their modifiers, and if he could then have said "Here are certain numbers which, applied to the folio edition of particular plays, according to definite laws lead to a clear and consistent narrative," men of sense might have been content to look into the matter. The inherent *à priori* improbability that a narrative about Shakespeare should be concealed in a badly printed edition of plays really written by Bacon but attributed to Shakespeare would have outweighed tolerably heavy probabilities of the *à posteriori* sort, and the coarse brutality of the narrative which appeared actually to result from the application of the suggested method would be a very strong argument against the reality of the discovery. Yet it would be impossible to avoid noticing evidence so curious; and if the case were found to be as suggested, antiquarians would be set inquiring who might be the wretch who had so arranged the printing of the folio that it contained evidence injurious to the reputation alike of Bacon and of Shakespeare. Certain that the ill-written, and in parts perfectly loathsome, story could not be Bacon's work, who, with all the faults which marred his greatness, never did aught which could compare with the foul offence imputed, we might imagine some enemy alike of Bacon and of Shakespeare venting his malice and misapplying his ingenuity and industry, to foist into a noble play his own coarse and offensive imaginings. But the interpretation given to the matter by Mr. Donnelly and his following no man of sense could for a moment admit.

Fortunately we are perplexed by no such puzzle. Mr. Donnelly's search began at the other end. He worked on a plan which was bound to give him a cypher system enabling him to find anything he liked in any one of Shakespeare's plays, and in any edition on which he chose to labour. He says, indeed, that those who speak thus of his wonderful work have not themselves shown that such work can be easily done. Not one of them has shown that with a sufficient set of cipher numbers and modifiers, and a sufficiently wide choice as to starting points, ways of counting, and so forth, you can find any story in almost any printed work, though more conveniently in a work like the folio edition of Shakespeare, with its brackets and hyphens and irregularities in the use of both. This, we may readily grant, and rejoice that it is so. A man foolish enough to waste time and ingenuity on work so worthless would be foolish enough to believe in the results he evolved as having a real value. But luckily such folk are few. Were it not for Mr. Donnelly, we might have hoped that they were impossible.

The way in which Mr. Donnelly has worked at his foolish task has been quite obviously such as must inevitably lead him to some such result as he has obtained. With the notion that the occurrence of such words as Francis, Bacon, St. Albones, Nicholas, &c., was to be specially noticed as likely to suggest the key to some cipher, he counts backwards and forwards from all such words, to tops or bottoms of columns, beginnings of scenes, breaks in the printing, and so forth, including and excluding in different counts the words in brackets, counting hyphenated words as one or two, and otherwise varying his count. Failing to find any one number, as indicated in this way, he strives to limit the numbers to which he is thus led to as small a list as possible, the device of "modifiers" helping him to make a list which is really long enough look smaller than it is.

Now it stands to reason that a series of numbers thus long enough to account for the occurrence of all the more characteristic words dealt with in this initial search for cipher numbers, must equally suffice (or suffice even more readily) to lead by the use of equally varied counting methods to any word in the text of the plays which Mr. Donnelly in concocting his narrative might want. Suppose he wishes to find in the play of Henry IV., first part, folio edition, the words "Will Shakespeare is a miserable wretch," or "to that defect." All he has to do is to take a concordance and find where the several words he wants occur in the play, and then to work backwards and forwards from each in succession with each one of his varied methods, numbers and modifiers, until he comes on one count which brings him to a point which he may confidently describe as a natural starting point. He thus successively finds "will" and "shakes" and "peer"—of course he has no trouble with "is" and "a"—but the words "miserable" and "wretch" are not to be found, for the simple reason that, as it chances, neither occurs in the play. This, however, is a matter of no importance. For "miserable" substitute "wretched," and for "wretch" substitute "fellow." Find an effective count for each, and, lo! we have the sentence, "Will Shakespeare is a wretched fellow." We have only, then, to urge the argument from probabilities (confident in the general ignorance of mankind about its laws), asking what are the odds against these six words coming out in grammatical sequence (though we know full well that by our method they, or an equivalent set, were absolutely certain to come out under the actual conditions), and our case is nearly complete. We make any narrative we like in this way, working in whatever our taste, or absence of taste, may suggest, and tell the world that that narrative was found in the famous folio edition of Shakespeare.

I have said that, in this way, our case is "nearly complete." But there is still a touch to be added, by which the confiding public may be more thoroughly gulled. If only it can be shown that the numbers and modifiers we have been obliged to use may all be represented as derived from one, the effect will assuredly be decisive so far as the ignorant many are concerned.

Now our numbers in this particular case are 505, 513, 516, 506, and 523. We have kept them carefully from diverging too widely by the suitable choice of starting points. The difference between the highest, 523, and the lowest, 505, is only 18. If, then, we can in any way find a set of five numbers running pretty nearly equal, but which may by any device whatsoever be able to show differences corresponding to those between our five numbers, we shall be able to reduce these five different numbers to one number. There are only four differences to be accounted for, viz., 8 (513—505), 11 (516—505), 1 (506—505), and 18. Suppose we can find a column, or a page, or a scene in our play in which there are 18 words which are in some way distinguished from the rest—or, rather (for so much we can surely find), suppose we examine every section, be it page, column, or scene, fulfilling this condition—and then inquire whether we cannot in some way separate 8, 11, and 1 of these 18 exceptional words from the rest. The odds are enormously in favour of our being able to do this, though there are other devices to be tried if this one fails. (Some of these, indeed, Mr. Donnelly doubtless did try before trying this one, and finding, after continued search, a case that suited his requirements.) The case occurs at p. 74. (That page is unfortunately not in the first part of "Henry IV.," where Bacon, Francis. Nicholas, and other striking words had been noted; but I venture to say it would have suited

Mr. Donnelly's purpose if he had found it in "A Midsummer's Night's Dream" or "A Winter's Tale.") In the first column of p. 74 the following words are in brackets, "Making the winde my post-horse" and "Under the smile of safety," or *ten* or *eleven* words in all, according as we count "post-horse" as one word or two. There are six hyphenated combinations, namely, "post-horse," "well-knowne," "peasant-Townes," "worme-eaten-hole," "smooth-Comforts-false," and "True-wrongs" (one only of these, the first, falling within a bracket), so that as these 6 contain 14 words, we have a means of obtaining a difference of *eight*, which is one of those we want. We already have *eleven*. Adding these eight to the ten already mentioned we have *eighteen*. Lastly, the word "post-horse," the only hyphenated word within brackets, gives us the difference *one*. Thus we have all the differences we want, besides a few more if we had had occasion for any:—

If all the words including the bracketed words and regarding the hyphenated words as two or three are counted, we have 302 words in the column. By counting the hyphenated words as one each, we reduce the number by *eight*, or to 294. Counting only "post-horse" as one, but leaving all other hyphenated words as two or three, we reduce the 302 words by *one*, or to 301. Omitting all the bracketed words, but regarding the hyphenated words as two or three, we reduce the number 302 by *eleven*, getting 291. And, lastly, if we omit all the bracketed words and count each hyphenated word as one, we reduce the number 302 by *eighteen*, giving 284 words.

Having by this artificial arrangement (to which, were the truth known, we have been forced after multitudinous trials of more natural ones) obtained five numbers differing from each other by the required numbers, we make a fine show by setting these five numbers under the other five already known to differ by the self-same amounts (for what else were we looking?), and showing that addition gives equivalent totals (as, of course, it cannot fail to do), thus—

302	294	301	291	284
505	513	506	516	523
807	807	807	807	807

We might now describe the number 807 as the master number or cipher-key. But it happens that there is a "modifier" 29 as yet not accounted for, which we may as well work into our cipher-key. What is to prevent us from adding 29 to 807, and calling 836 the master number of the cryptogram? Nothing except the necessity of first finding the number 836 somewhere or other. But we can find it a dozen times over, if we only look for it with sufficient resolution. If we cannot get it in a page or scene, we can take some word which we may regard as striking—"found," for example—and counting backwards and forwards 836 words from that with suitable selection of the method of counting (that is including or rejecting bracketed words as may be convenient, and also as may be convenient counting hyphenated words as one or two, we are bound to come out in one or other of at least eight methods of counting available, at some point which we may insist on regarding as obviously an intended starting-point. If we find that by leaving out bracketed words and counting hyphenated words we can reach a convenient starting-place, we can then find how many words the same starting-place will give if bracketed words are all counted and hyphenated words dealt with as if there were no hyphens. Say the number is 900; then we can find some other use for this number, and we can, moreover, make quite a point of the remarkable circumstance that 900 exceeds 836 by exactly the number of bracketed words and of hyphenated words counted in one case to make 900 and left uncounted in the other to make 836. All this will be very impressive—to the reader, at least, who has been deterred by the array of numbers from paying any special attention to the way in which the numbers have been obtained. Anyone who has attended will see that nothing else could happen.

But while Mr. Donnelly is very careful to hide from his followers the simplicity of the plan by which he has been able to work his own self-reading narrative into the play selected for defilement, he not less carefully avoids the discussion of the overwhelming difficulty of the task he supposes Bacon to have accomplished.

The very ease of Donnelly's task results from the complexity of the system he imagines, and the consequent diversity of the paths of interpretation open to him. Yet he would have us believe that a long story has been interwoven in this mo t complicated fashion into a particular edition of a play which had been already *five times* printed. The folio text was printed from that of the fifth quarto, published in 1613. Now if any one will examine that quarto, and conceive himself planning a reprint with a story to be woven in on some complicated cipher-system, without departing in any essential respects from the quarto edition, he will in a few minutes perceive that the task would be not merely difficult, it would be absolutely impossible. If Bacon besides his own undoubted mental powers had possessed the creative power of a Shakespeare, while instead of being essentially unmathematical he had possessed the combined mental powers of all the mathematicians who have ever lived, even then had been hampered by the conditions imagined by Mr. Donnelly, he could not have wrought a sentence of twenty words, nay, nor of ten or five, into an edition differing so little from the fifth quarto as does the folio text of "Henry the Fourth." It is one thing to puzzle out a cipher story from a sufficiently voluminous collection of words; quite a different and an altogether more difficult thing to bring a cipher story into a poem, play, or other definite literary work, without interfering with its congruity. But this last task, which many, I find, imagine to be all Mr. Donnelly attributes to Bacon, would be child's play compared with the task of so arranging the printing of a new edition of a work already published that a cipher story should be included in it, even one of the simplest sort. That a man like Bacon would devote ten minutes of his valuable time to an attempt of the sort, when one minute would convince him of the impossibility of the task, would be an absurd supposition, even though the story to be wrought in were of the utmost importance. That he would think for a single second of working in the heap of imbecile nonsense attributed to him by Mr. Donnelly, no one but a madman could imagine.

TRANSMIGRATION OF SOULS.—Father Alcott used to say that he remembered having lived previous to this life. The Hindoo believes in his past as we believe in our future. This life, to a Christian, is probation; and that is the way he accounts for the evil in it. It is not perfect, but it is preparatory to the perfect. On the contrary, the Oriental says the evil of this life is the consequence of sin in a previous life, and it is therefore to him the real hell. His object is to escape from it as something that ought not to be. He is in prison because of the past; the Christian fears he will fall into prison hereafter. Both systems involve considerable moral influence, and, it is probable, prevent a vast amount of wrong-doing. But when we undertake to hinge together two lives, there is considerable liability that any system will fall into the habit of placing undue value on theories concerning the unknown. Father Alcott must have had the advantage of a remarkably good memory. Will the Occidental in the future life have no better recollection of the present than the average Oriental has of his former life? In the meantime let it not be forgotten that the Apostles' Creed associates the life everlasting with the resurrection of the body. The faithful must not feel free to reject this and accept that part of the Christian creed (*vide* Pearson on the Creed).—"The Future Life."

XUM

SPECTRAL MANIFESTATIONS.

IN the March number of KNOWLEDGE there is an article entitled "Have Ghosts been Seen?" in which the writer describes various forms and instances of "Spectral Manifestations," and deplores the inability of science to account for them. The article in question describes these phenomena as being presentiments that something of a dreadful or most impressive nature has affected a dear friend or relative, and that they are almost always, if not invariably, confirmed by the event; moreover, that these phenomena are unusual. It must be admitted that these strange visions mostly terminate in accident, sickness, or even death; but the writer of this knows two or three cases where the ghostly visitor was the bearer of good tidings.

If these phenomena were limited to dreams and unusual noises, the difficulty of solving the mystery would not be so far from our reach, as a too active brain would in most cases be accountable for the former, while the latter has been ascribed to a defect in the brain in connection with the aural nerves; but when we come to "Spectral Manifestations," how are we to account for them? The object of this article is to suggest that "animal magnetism" is the agency through which we are able to perceive these spectral manifestations. Nature has given five senses to man generally, namely, sight, touch, hearing, smell, and taste; but to some she has been more lavish and has endorsed them with what is commonly called a sixth sense. This sixth sense is, to a certain extent, beyond explanation; the nearest approach we can make is to suppose it a higher development of some of the ordinary senses, such as touch and hearing. Persons endowed in this way are extremely sensitive. They can often perceive, if placed in a dark room, the luminous flames or scintillations from the poles of a magnet, or from the extremities, especially the fingers, of any one possessing a highly magnetic body. These persons must not be mistaken for cataleptic patients. The subjects we have to deal with are healthy both in body and mind. The most important feature of this extraordinary sensitiveness is that its possessors are so mediumistic for mesmerism. Now let us see what mesmerism really is.

Mesmerism, or correctly magnetism, is artificial somnambulism, the latter being the natural force—hence if we mesmerise a man we make him somnambulistic, but at the same time subservient to our will. Science and experience have taught us that somnambulists do not use their eyes in the ordinary sense when in this magnetic state—that is, as reflectors; the optic nerves must be requisite, but then seemingly in conjunction with others.

These spectral phenomena are unusual; at least, we only occasionally hear of them; equally rare are these cases of persons so specially gifted. Does it not, then, appear feasible to contend that these said persons are the only ones that can see "spectral manifestations"? If it is such an easy matter to influence their minds, and almost their entire systems, when in the same room, may it not be equally possible to manifest the same power from a distance. Again, when these visions appear, there is usually something sad happening to one dear to us, and that solicits sympathy. That is what these sensitive persons can "feel"; they instinctively know that this friend, say, is in trouble, and their power of sympathy is so great that they can often feel the pain as acutely as the individual afflicted.

If, then, through the agency of some magnetic power it is possible for certain specially gifted persons to be cognisant of a friend's suffering—which may be occurring hundreds of miles away—it must be the same force operating on other nerves that enables these same persons to see "spectral manifestations."

CHARLES E. COWAN.

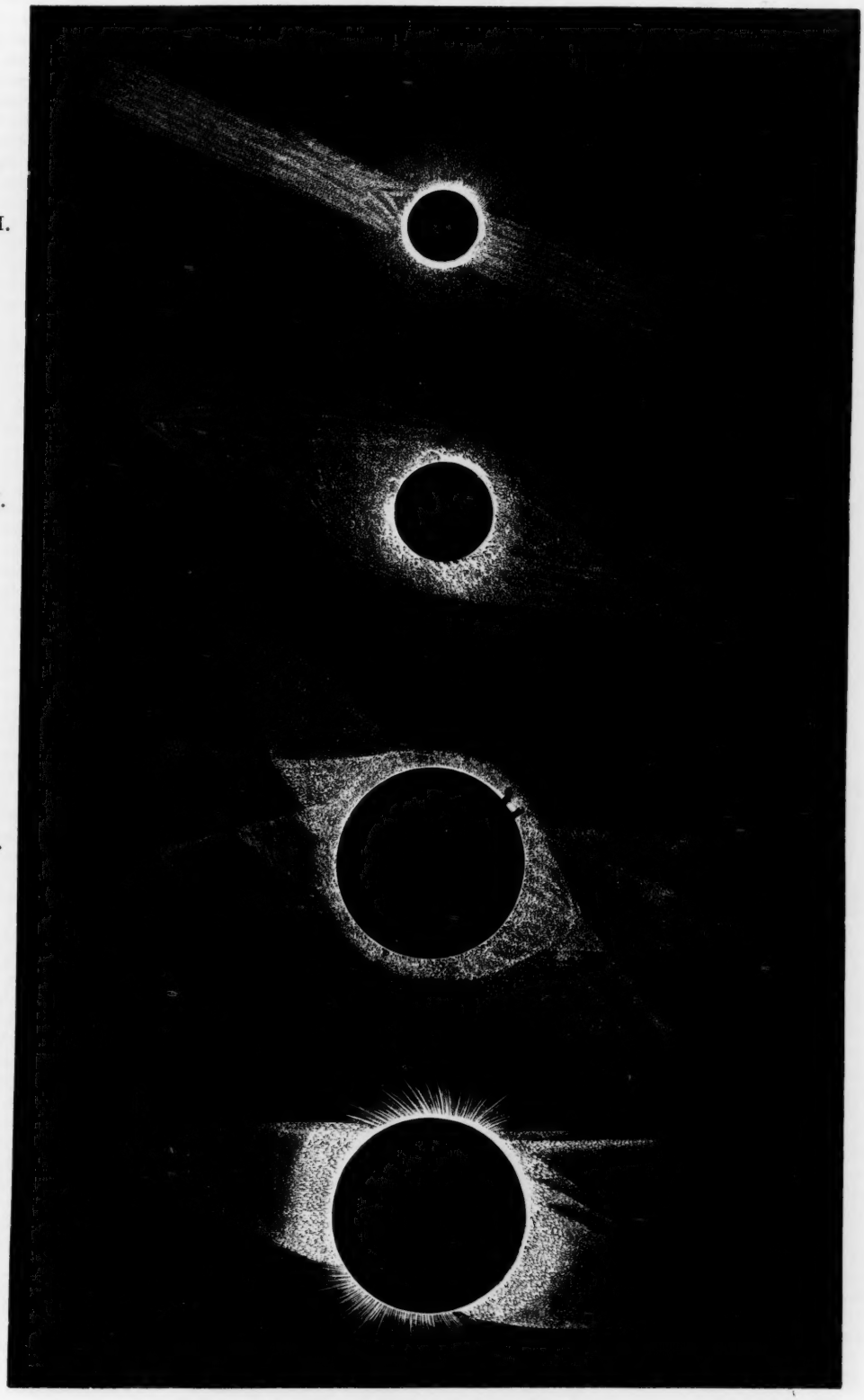
NOTE ON TOTAL SOLAR ECLIPSES.

I HOPE European astronomers will not waste time and money in attempting to visit North-Western America to see the eclipse of January 1, 1889, for I believe that only disappointment is likely to result. It is practically certain that nothing worth knowing can be added on this occasion to what has been learned under more favourable conditions. For the eclipse will last but a very short time, and the sun will be very low at every American station.

I may take this opportunity of recalling the valuable results obtained during the eclipse of July 29, 1878, when observations were made under favourable conditions from lofty stations. Amongst other such places Pike's Peak in Colorado was occupied, and at heights ranging from 5,000 to 10,000 feet above the sea-level observations were made which served to prove, what had already been recognised by the more thoughtful, that the visible extension of the corona depends almost wholly on the clearness of the air through which the region around the eclipsed sun is observed.

The greatest extension of the corona was observed by Professor S. P. Langley, whose drawing of the corona (made from a station on Pike's Peak, about 10,000 feet above the sea-level, is shown in fig. I. of the accompanying four. It is to be noted, however, that he observed the coronal extension on the right first; he next turned to the left side, where the extension was greater, amounting to six diameters of the moon; he then looked around for rays, perceiving none; and finally he looked again carefully at the left side, and found the extension to be now twelve diameters on that side. He felt that his eye was at this time only beginning to be in the right condition for recognising the delicate light of the long radial streaks, and adds that "the twelve diameters through which I traced" the streak on the left "*were* (I feel great confidence in saying) *but a portion of its extent.*" (The italics are his.) It is clear that the inferior extension of the ray observed on the right corresponded with the less sensitive condition of Professor Langley's eye when he looked at that side of the corona. It will be observed that he assigns to it a length of more than four diameters, the ray on the other side having an apparent length of six diameters, as seen afterwards, and going to a length of twelve diameters later. Had he been able to look at the left side later he would doubtless have found, like Newcomb, the extension on that side as great as on the other. Of the coronal wing he did observe, he says, "the central part was brighter than the edges, which were so diffuse as to make the determination of its boundary difficult. It was not so absolutely structureless as the zodiacal light, perhaps, and it appeared longer in proportion to its breadth than that, otherwise I should compare it to the zodiacal light with more confidence than to anything else.

Several interesting views of the corona were obtained on this occasion. Professor Newcomb, hiding by means of a disc set on a pole a circle 1° in diameter (with the moon in the middle), was able to trace the corona in two long extensions, nearly coincident with the ecliptic, to a distance of about 6° from the disc on either side. They looked, he says, very like the zodiacal light on a reduced scale. Six degrees from the disc would be $6\frac{1}{2}$°



Drawings of the Corona, July 29, 1878.
I. Prof. Langley. II. Prof. Newcomb. III. Mr. Denison. IV. From the Photographs.

from the disc's centre, or at the sun's distance more than ten millions of miles. His drawing is reproduced in fig. II. In comparing it with the others it must be remembered that the black disc is not the moon, but the circular screen having an apparent diameter of 12° and nearly twice the moon's.

Mr. Charles Denison's drawing of the corona (fig. III.) is interesting as indicating the effect of perspective. We see from it how the overlapping of the luminous tongues of the corona produces such shapes as had seemed perplexing in Liais's drawing. The two well-marked star-pointed radiations seen on the left (with apices about two-thirds of a diameter from the moon's edge) are seen not to indicate any actual radiations having these definite shapes, but to be produced by the overlapping in the visual field of three much longer radiating beams. We may infer that in all probability these longer beams are themselves in turn produced by the overlapping of beams longer still, but too faint to be separately discernible. It will be observed that as thus interpreted the several outlines of these pointed beams are in all cases real; what is unreal is the association of two outlines which really belong to different streamers into the apparent outline of a single-pointed beam.

We see no indications of the inner set of pointed beams in fig. IV., which represents the results of photography as employed at various stations during the eclipse of July 1878. From this we may infer that the eye was more sensitive to slight differences of luminosity in the coronal beams on this occasion. The absence in the photographic picture of some of the beams shown in Mr. Denison's drawing indicates their relatively small actinic intensity. On the other hand, the delicate curved streaks seen over the parts of the moon's limb between the long streamers are much better shown in the photographs than in most of the drawings.

AN INTELLIGENT CAT.*

MISS KITTY is a favourite member of our family, and she is possessed of so many graces and virtues that I am glad to bear witness to her worth in a brief biography. She is an humble creature, but she lives up to the highest capabilities of her nature, and a careful study of her ways has convinced me that the "godlike reason," of which we assume a monopoly, does not go altogether upon two legs, but is shared, in a greater or less degree, by our four-footed companions.

When she came to us at first Kitty was a little waif, timid and shy, and scarcely four weeks old, and her terrified look, as she crept out from underneath the verandah of our country house, told plainly that she was conscious of having come into a world where cats got far more kicks than caresses. This was but natural, for only the day before she had seen her mother slaughtered by a brute of a boy, and had herself escaped merely because she was too young to render her peltry of any value. We gave her food and spoke kindly to her, but it was days before we could lure her into the house, or induce her to accept our caresses. She would start at the slightest sound, and she wore a look of constant fright, as if the tragedy of her mother's death was continually before her. Gradually, however, the terrible vision seemed to fade from her memory, and she became very playful and affectionate. She would climb upon our laps and our shoulders, and putting her soft cheek to ours, would caress us most fondly. Her favourite station during the day was on my writing table, where she was accustomed to curl herself up and, when awake, to watch the movement of my pen as it glided over the paper. She did not appear to understand this at first, but she very deliberately proceeded to investigate the phenomenon. After watching it one day for a time, she reached out her paw and touched the penholder. I kept on writing, and this, I suppose, gave her confidence, for when her paw had followed my hand once or twice across the sheet, she clutched the pen herself and attempted to go on with the writing. The result was a huge blot upon the MS., at which Kitty gazed aghast for a few moments; then, giving me a sad look and uttering a plaintive wail, she again seated herself near by and looked on in silence. Daily she came upon my table and watched my proceedings, but never again did she volunteer to aid me in the work of composition.

Thinking to arouse Kitty's artistic sense, I one day placed before her a book filled with engravings of animals. She regarded the strange creatures for awhile with some interest; but when I turned the page to one of the cat kind, she gave her head a peculiar toss, by which she expresses contempt or disapprobation, and silently walked away, thus plainly intimating that she could distinguish between the sham and the real. Her strongest admiration was for her beautiful self, and she was, and is, the perfection of feline beauty. She has a full, shapely head, a rounded, graceful form, large, dark, speaking eyes, and a clear black and white coat, as soft and glossy as silk. While still so very young, she never tired of gazing at herself in a glass. One day I set a small toilet mirror upon the floor, so that she could see her reflected image. She gazed unconcernedly upon it for a few moments, but as soon as she observed that the kitten in the glass responded to her every movement she opened her eyes wide with astonishment. Then, looking up at me inquiringly, she proceeded to investigate the toilet-glass, walking round and round it, and now and then tapping its wooden back with her paw. When she had apparently become convinced that it did not conceal her own counterpart, she again set herself down before it and began to smooth her coat and stroke her whiskers, all the while keeping one eye fixed upon the reflected kitten which was performing the same ceremonies. At last she fell asleep, and I set the glass away upon an upper shelf in my library; but she no sooner awoke than she came to me, looked up at the mirror, and by a pleading mew asked me to place it again upon the floor. This I did day after day to the great delight of Miss Kitty, who would sit before it for an hour at a stretch, prinking and pruning herself like any human coquette. One day, having a visitor, I failed to respond as promptly as usual to her request for the glass, and she suddenly darted into an adjoining room, where, half an hour later, I found her perched upon the top of a bureau, and surveying herself in the larger glass that hung above it. She had detected the likeness between the two mirrors. After that she never petitioned me for the toilet-glass, for one of her commendable traits is never to ask of another what she can do for herself. But even now, in mature cathood, she exhibits this feminine vanity. Often I come upon her posed before a mirror, and I think no four-footed creature ever assumed quite so many airs as she did a little time ago, when she first saw upon her neck the reflection of a gorgeous leather collar.

Until Kitty was about three months old we considered her too young to profit much by instruction, but then my wife set about giving her a little cat-education. She had no difficulty in teaching her to ask for her dinner by a rub against the table leg, and to respond by a wag of the tail to almost any simple question. Very soon the questions, "Do

* From an article by Edmund Kirke in the *North American Review*.

you love me?" and "Are you a good little Kitty?" were uniformly answered by an energetic wave of her caudal appendage. Her wants from the first she spontaneously made known by a pull at my wife's dress, or by a peculiar mew which has a wonderful likeness to human speech. From her first domestication she has slept in our chamber, and if now and then shut out of the house when it was locked up for the night, she would climb upon the verandah which runs along the front of our summer residence and tap upon our window for admission. Sometimes she did this at midnight, and we, being fast asleep, would fail to respond very promptly to her summons. In this event she would, on being let in, stamp her foot upon the floor and scold away at us for fully five minutes in a peculiar tone, a kind of mutter that was both rapid and decided.

Among other things which my wife at this time taught the feline lady was to turn somersaults upon the floor, to play at hide-and-go-seek, and to run in a hurdle-race around a large room. This last used to come off in the library, the hurdles being piles of books placed at irregular intervals, and Kitty vaulting over them in a race around the apartment. At first she was lured into this performance by a string drawn rapidly across the book-piles, but soon my wife was able to omit this incitement, and get Kitty into the race by merely giving her the word at starting. She enjoyed the performance greatly, and invariably asked for it every evening after supper until she became a mother and engrossed in the duties of maternity.

She was about a year old when this happened, and it has seemed to develop her nature wonderfully. Ever since she has given clear and striking proofs of that ability to combine means with ends and that power of deducing one result from another which we term "reason." Her memory also has grown remarkably clear and strong, as a little incident will illustrate. Some ladies whom she had not seen for a whole year called upon us one day during last summer, and she at once greeted them with every sign of recognition. The hurdle-races had been for a long time discontinued, but on our visitors expressing a desire to again witness the performance, we ranged the books around the room, and, my wife giving the word, Kitty at once vaulted over them with all her old agility. She had made two or three circuits of the apartment, when she suddenly paused as if a new idea had just struck her. Her four kittens, now about four months old, were in the room, and they had paused in their play to witness the performance; and now Kitty called them to her, and addressed them in an energetic manner. At first they did not seem to comprehend what she wanted, but, taking her idea, my wife produced a string, and calling "Little kitties," proceeded to draw it across the books in the old manner. Instantly the kittens were after the string, and Kitty was after the kittens, going round the room in flying leaps, and urging them forward with cries of encouragement. Once in a while one of the little fellows would dodge the books, or fall out of line, and then his mother would pause in her flight, and, cuffing his ears, force him again into the race. Soon my wife withdrew the string, and then they went on without it—five cats chasing one another in a hurdle-race around the room, while we and our guests were shouting with laughter. Often afterward the performance was repeated, and always at its close both the cats and the kittens would come to us for some mark of our approval.

Kitty has exhibited in a high degree the wonderful instinct which guides the cat in training her young, but she has also shown in their education an adaptation of means to ends which, with neither cats nor men, is instinctive. For instance, she would bring live mice and squirrels into the kitchen, and, setting them free, would set her kittens to hunting the creatures. This was instinct, but reason came in when the mouse or the squirrel got away, and hid behind some article of furniture, where neither cat nor kittens could get at it. Then Kitty would ask my wife or the servant to remove the article; but if it happened to be too heavy for a woman's strength—and it usually was a large cupboard—she would come directly to my "den" in a remote part of the house, and insist upon my going at once to the rescue.

As they grew older Kitty's progeny took to climbing, and occasionally one of them would push himself upon an upper branch of some tall tree, whence it dared not come down, and where Kitty knew she could not venture her own weight in safety. On such occasions she would rush into the house and appeal to my wife, who would call our farmer's boy, and send him up the tree to rescue the endangered kitten. Once on a time my wife could not be found, and, after searching for her in vain, Kitty went herself to the barn, called the boy, and led him to the tree up which was the venturesome kitten. The little fellows thought it rare fun to hide away in the near-by woods where their mother could not find them. To her cries for them at such times they would pay no sort of attention; but they never heard my wife call "Little kitties—come home, little kitties" but they came trooping toward the house as fast as their little legs could carry them. Observing this, Kitty never failed to ask her aid in such circumstances. On one occasion all four of the kittens had disappeared, and the cat and her mistress had for a considerable time searched for them without success in the neighbouring bushes and undergrowth, when suddenly Kitty sprang up a tall pine to its very top, whence she could see all the surrounding woods. In a few moments she was down again, and then, making to my wife a peculiar gesture of the head by which she indicates that she desires to be followed, she led her to a considerable distance in a direction never before taken by the kittens, and there, perched upon the top rail of the farm fence, were the four runaways.

Upon another occasion, when the servant was absent from the kitchen and my wife was upstairs in the most remote part of the house, Kitty came bounding up to her, with an urgent demand to be followed. She led her directly to the kitchen, and there was a strange man who had no business on the premises. A like intelligence Kitty showed one dark and stormy night, when we had inadvertently gone to bed leaving her out of doors. About midnight she came to my wife's bed, woke her up and beckoned her to follow. She led her down to the dining-room, where the glass door, leading out upon the verandah, stood wide open. Observing this, she had entered by that way, instead of coming, as usual, to our chamber window, and, knowing that the door should not be left open, she gave my wife this notice before retiring to her nightly quarters. And this reminds me that though Kitty often makes demands upon me in the daytime, she never wakes me at night, however great may seem to her the emergency, and this she does without having the least instruction on the subject. Making not the slightest noise, she comes to my wife's side and rouses her by springing lightly upon the bed and gently stroking her face, but she lets me rest in quiet. She has the good sense to know that a man who works with brain or hand all day should be left at night to enjoy unbroken slumber. I could relate numerous instances similar to the foregoing, but I have now space for only a sad catastrophe that befell Kitty and her little family.

The four kittens had grown to be nearly as large as their mother, when Kitty had another litter—three little fellows. Soon afterwards a distemper appeared which swept away nearly all the cats in the neighbourhood, and one after

XUM

another it carried off the four kittens. They were taken at first with a strange drowsiness, then, after moping about for a short while, they went off into the woods to die. This had happened to all the four, when Kitty was herself taken with the distemper. Her younger kittens were below stairs, and the first intimation that we had that she was seized with the malady was the discovery that she had carried the little fellows up to our chamber, and deposited them in the drawer of a bureau which happened to be open. We had been fearful of this, and only the day before had asked medical advice against such an emergency; and now, with the medicines in our hands, we hastened to the woods, where we knew she had secreted herself. After a long search we found her hidden away in some undergrowth, in a comatose condition, and scarcely conscious, but still able to give a slight wag of the tail when her mistress asked, "Are you a good little Kitty?" We then gave her the proper remedies, and bore her back to the house, where she was given every possible attention. By constant care we managed to keep the breath of life in her body; but she refused all food, and for fully ten days lay in a lethargic condition. Meanwhile her kittens had to be drowned, for they were too young to take any nourishment except from their mother. At last she came to herself, and then the first thing she did was to go up to the bureau where she had deposited her kittens, and the look of distress that came upon her face when she discovered they were gone was almost human. She mourned for them for many days, and she would not be comforted.

After this event Kitty would scarcely let her mistress go out of her sight. Ever since she has clung to her with a strange tenacity, and day by day has shown for her a constantly growing affection that is most remarkable. It was on this account that we this autumn brought her with us when we moved into our winter home, instead of leaving her, as heretofore, with the farmer at our summer residence. She has adapted herself to her new home, and to the change from country to city life, with a readiness that entirely disproves the common opinion that cats are more attached to places than to persons.

LIFE IN OTHER WORLDS.

IT is not generally noticed, I think—or rather it is not generally remembered—that the question of life in other worlds belongs altogether to modern times. I do not say it belongs to modern science, for in reality it is not a scientific question at all, belonging rather to the domain of philosophy than of science. But it never was discussed as a question either of science or philosophy until some three hundred years ago. Before that time men no more imagined that besides our earth there may be other worlds, like her the abode of thousands of races of animal life, and myriads of forms of vegetable life, than they conceived the possibility that the earth, the heavens with all their thousands of stars, with the sun the glory of day and the moon the light of night, were intended for any other purpose than to adorn and benefit the earth. The supposition that among the orbs in the heavens there might be some akin to the earth in character and dimensions, or even much larger than her, while the fixed stars themselves might belong to an even higher order in the scale of creation—being suns like our own and the centres of families of worlds akin to the solar system—would have seemed wild and fanciful in the extreme.

We find the same ideas in this respect, whether we examine those parts of ancient literature which have been gathered together into a book regarded as sacred, or those other portions which are called profane—the recondite reasons for which distinction do not concern us here.

In Hesiod, Herodotus, and Thucydides, Virgil and Horace, as in the ancient Egyptian, Assyrian, Indian, and Chinese records, we nowhere recognise a trace of any idea that our earth is not the only world. Repeatedly we find references to other races of beings than men, gods and goddesses, beings angelic and beings demoniac, unseen beings having their abodes in the mountain, the sea, and the rivers, dwelling in trees and in animals; in fine, wherever the lively fancy of the child man could conceive them. It was not for want of imagination that the ancients failed to picture other worlds in the planets and other suns in the stars; it was simply that they knew of nothing to suggest the thought, and in like manner in the various books, both of the Old Testament and the New, there is no suggestion of other worlds. Sun and moon are pictured as made for the earth's sole benefit. "He made the stars also" for the earth alone, "to be for signs" (in the astronomical sense) "and for seasons and for days and years." The possibility was not even thought of that our earth is an orb moving in the skies of other worlds as Jupiter and Saturn, Venus, Mars, and Mercury move in ours, or that the sun which rules our day is one among those other suns, "the stars also," which shine in the skies of the thousands of worlds within such distances from our system that our sun is as a star for them.

I know it has been suggested that where, in the Bible, reference is made to "the host of heaven," the suns and worlds peopling space may be referred to. But the best proof that this is not so is that the words were never so understood, nor was any suggestion ever made that they should be so understood, until discoveries had been effected of which neither the writers nor the readers of those words in ancient times had any inkling. It is but a feeble way of defending those ancient writers from purely imaginary discredit for not knowing what they could not know, to maintain that they could not write so as to be rightly understood. Manifestly, however, their writings corresponded (in this respect as in all others) with the condition of knowledge as it existed in their day.

It could not be until the Copernican theory had been established that the idea should begin to grow upon the minds of the more thoughtful that since our earth is but one of the sun's family of planets, she is probably but one among God's worlds. Of course this idea ought logically to have found favour at once. Yet I apprehend that no one who has noticed how slowly even in these scientific days the consequences of newly discovered truths are appreciated, will be disposed to wonder that many years passed before even Copernicans began to admit the doctrine of other worlds than ours. It was not until the power of measuring the solar system, and comparing the various planets together and with the earth, that men began clearly to perceive our earth's position as but one among a family of orbs, some of which, indeed, are smaller than herself, but two of which could be seen even in these days to be very much larger. Even if they had supposed our earth to be *primus inter pares*, they would still have been obliged to regard the others as in all probability akin to her. But when she was perceived to be neither first nor last in size and importance, the more thoughtful perceived the absurdity of regarding her as the only one among the planets which is the abode of life. An insect living in a tree in the midst of a forest might as reasonably think his tree the only possible home for insect race.

As astronomers penetrated more and more profoundly into the depths of space, the belief in other worlds and other

suns naturally became more certain and more general. As they studied the members of the solar system with the telescope, they began to recognise features of resemblance between other planets and the earth, which confirmed them in the opinion that all the planets are worlds. With growing knowledge the doctrine of life in other worlds grew in favour and in interest. Christian Huyghens spoke earnestly in its favour. Fontenelle was enthusiastic in urging it; writers like Drs. Dick and Chalmers gave to it an almost religious colouring; and at last when Dr. Whewell, after advocating the doctrine of other worlds in his contribution to the "Bridgewater Treatises," called it seriously in question in his "Plurality of Worlds," the venerable Brewster (Sir David of that ilk) was moved in his wrath to denounce the Master of Trinity as one who strove to shake men's faith in a doctrine which he described as "the hope of the philosopher and the faith of the Christian."

The subject had reached this position when I was led to take it up, not—let me admit now—for its own sake, but as a convenient subject with which to associate the results of scientific researches which I could in no other way bring before the notice of the general reading public. That the subject, though not scientific, and though for my own part I had been rather wearied by the over-warm discussions of Whewell and Brewster, has an attraction of its own, is well shown by the circumstance that though I had a strictly scientific purpose in writing my "Other Worlds Than Ours," I became quickly interested in the philosophic problem with which I had ostensibly undertaken to deal.

I think I was the first to recognise the change which the researches of the last half century or so should introduce into our ideas respecting other worlds. So long as men recognised the past of the earth and of the solar system as measurable by a few thousand of years, it was natural that they should regard the planets as simply a family of worlds, all in the same stage of world life. Their view of the solar system may be compared to the view we should take of a plantation known to be but a few years old, in which we should expect to find no marked varieties of age or condition among the trees—supposed all to be of one kind. But precisely as one who approached a portion of "the forest primeval" would expect to find, even among trees of the same order, all varieties of age, the seedling, the sapling, the tree growing old and decayed, and the dead and withered stump, so, recognising, as science now does, that the age of the solar system must be measured by tens if not by hundreds of millions of years, we must admit the probability, one may fairly say the certainty, that we shall find in that system every stage of orb life—from those orbs which being very large and massive have passed through but a small proportion of their exceedingly long lives, to those which being much smaller have passed to their mid career or onward even through the whole of their lives to the condition of planetary death.

I did not myself perceive this truth as distinctly as I have just presented it. A long time passed before I saw that the larger orbs must be the younger and the smaller the older, unless (as in some few cases may have happened) some great difference in the time of beginning orb life may have caused a smaller but later-starting orb to be at this present time younger than a somewhat larger planet. (Saturn, for example, appears to be younger than Jupiter, though being smaller he might be expected to be somewhat more advanced in planetary life; but in the fulness of time, I know not how many millions of years, Saturn will advance beyond Jupiter in development, even as our earth has long since passed both, and as the moon has long since passed the earth.) When first the thought presented itself to me that in the solar system there must co-exist many different stages of orb life, I saw it simply in that general way, and had no idea of the harmonious series into which I should later be able to arrange the various orbs attending on the sun.

So soon, however, as the connection between size and relative age is perceived, we see at once that the various orders of bodies within the solar system can be classified according to the several stages of orb life which they may be expected to illustrate, and that as a matter of fact they severally present the characteristics which we are thus led to expect. The largest orb of all—the sun—represents the first or glowing vaporous stage, the babyhood of orb life; the giant planets, Jupiter and Saturn, present all the characteristics of the second or fiery stage; the earth certainly, and Venus probably, present the characteristics of mid life; old age is recognised in Mars and Mercury; and, finally, the death stage is presented in the arid and desolate surface of our companion planet, the moon.

For a long time I was content with the advance (for such it seems to me) beyond the old-fashioned view. So soon as we recognise that the life-bearing stage is but a part, and it may be but a small part of an orb's career, we find a new meaning given to the universe of suns and solar systems. An extension of our ideas in regard to time, in some degree akin to the extension which they had already received in regard to space, is thus obtained. Doubtless it was a grand and impressive thought in old times to recognise each orb in the solar system as in the fulness of its life-bearing career, and to extend the same idea to the star-depths in such sort that each sun might be regarded as the centre of a solar system, each member of which, save the central orb, is now an abode of life. Yet is there in this view, which presents the whole universe as the scene of omnipresent life, a certain element of bitterness. *Surgit amari aliquid.* Before those multitudinous orbs became the abode of life there would have been universal lifelessness; and after they cease to be inhabited or fit for habitation (and no created thing can endure for ever) there will be universal death. But according to the view which I have suggested (the view, be it remembered, to which all the evidence points), though the number of habitable orbs be greatly diminished, it yet remains to all intents and purposes infinite, while, instead of regarding the duration of life in the universe as finite, we can perceive that it is eternal in time, even as it is infinite in spatial extension. For if, when we look at any star we infer, from what we know about our own star—the sun—and his family of attendant orbs, that at least one member of that star's family is the abode of life like our earth, at least one has been the abode of life in the past, though now dead like the moon, while at least one, like the giant Jupiter or his brother Saturn, though not yet the abode of life will become so hereafter, then repeating that lesson for all the stars visible to the naked eye, telescopic, or (far past telescopic range) visible in the mind's eye, we may say: There in those depths are millions, ten hundred thousands of millions of orbs the abode of life now, as many that were the abode of life millions of years ago, as many that will be the abode of life hereafter.

But while this extension of the old-fashioned views is impressive in itself and amply justified by the evidence from analogy, sufficient account is not taken of all the features of variety and of actual difference which distinguish planet from planet (even within our solar system) and sun from sun within the sidereal system. It is as though an insect after studying from within its own free home the various trees thence discernible in the forest, should have come first to the conclusion that other trees besides its own are the abode of life, and next, that some trees are much younger than its own tree home, and may therefore be quite unfit as yet to be inhabited by insect

XUM

races, while others are too old, or may even be but dead and withered stumps. This would be a decided advance upon that insect's former view; but it would be insufficient if the insect stopped just there. After a while the more thoughtful among the insect inhabitants of that tree would perceive that among the trees in the forest there were not only many that differed from its own tree home in being older or younger, but many which actually differed from it in kind, never resembling it closely in any one of the stages of their tree growth. The insect inhabitants of the tree would then perceive that trees thus differing from their tree home in nature were not probably suitable abodes for the same forms of life, or might even be obviously and demonstrably unsuited for kindred insect races. Extending to the solar system and its fellow systems the idea thus suggested only as a parable, the life-history of orbs, different orders must in all probability be entirely distinct, even though all pass through the same general stages of orb life.

For instance, the sun, regarded as an orb, is in that glowing, vaporous stage, which, in the earth's case, signified infancy. Yet, as regards his work as a supporter of life, our sun is in the very fulness of his career. He may quite possibly have no other special work to do in orb life; and after he has passed that stage when an orb is still instinct with its primeval heat and glows with its primeval lustre, he may remain a mass of idle matter, not himself the abode of life like our earth, nor any longer nourishing life in other worlds, as he did when in his prime.

Again, it may be that the giant planets, Jupiter and Saturn, are doing the best part of their life-work, if not practically the whole, in the present stage of their career. Unfit now to be inhabited worlds, they may ever remain so; or the time when living creatures could exist upon their surface may correspond to a time when the sun will have lost its light and heat, and when, therefore, existence would be impossible on the surfaces of any one among the giant planets.

We have at least as much reason for supposing that when our earth was in sun-like stage of her career, or later when, in the fiery stage, she resembled Jupiter or Saturn, she did work such as the sun now does, or performed such duties as Jupiter or Saturn may discharge to their attendant worlds, as we have for supposing that when the sun or Jupiter becomes as cool as the earth, they will be inhabited by creatures suitable to the condition which will then exist upon those respective orbs.

With regard to orbs like Mars and the moon, which are old or to all intents and purposes dead, we, doubtless, are justified in assigning to them, as the probable period of their life-bearing career, the time when they resembled the earth in condition more nearly than they do now. Yet, though orbs of both classes probably passed through such a life-bearing stage, it is unlikely, nay, practically impossible, that either can have resembled the earth closely at any time. It is not merely that the duration of the life-bearing stage on our moon, for example, must have been much less than that of the corresponding stage on the earth, but that the various conditions essential to life as we know it upon the earth cannot have existed at one and the same time upon the moon. When the moon's crust was like our earth's in regard to heat, volcanic activity, and so forth, the air and water must have been much less in relative amount, and such life as may then have been present on the moon must have existed under conditions very different from those now existing on the earth. On the other hand, when the lunar atmosphere was as dense as the earth's atmosphere now is, its constitution must have been very different, for that period corresponded to a much earlier stage of orb life; at that time also the moon's surface would have been greatly too hot to be the abode of living creatures such as we are acquainted with on earth

Recognising, as we now do, the general principles at least on which the evolution of animal and vegetable life proceeds, we can infer that even if the first forms of life on Mars, on Mercury, or on the moon were, or those on Jupiter and Saturn will be, akin to those on the earth—which is antecedently unlikely—yet the orders of animal and vegetable life developed on those other worlds could not but be utterly unlike those which, during the many million of years of her past life, have been developed on the earth. Perhaps on a much shorter-lasting planet like the moon the highest orders of life developed were altogether inferior to those developed on the earth. Perhaps on much longer-lasting planets like Jupiter and Saturn much higher types of life will be developed than have ever been developed on our planet. However this may be, whether the best types developed elsewhere have been or will be superior or inferior to those developed on the earth, this at least is certain—they must be very different. Life, animal as well as vegetable, in other worlds than ours, must be infinitely varied.

THE MORDEY ALTERNATOR.

THE machine which is illustrated by the accompanying views is being brought out by the Anglo-American Brush Electric Light Corporation, Limited, for use in connection with distribution on the transformer system. It is one of a new type, and possesses several advantages of practical importance, and it is quite a new departure in dynamos. It is the invention of Mr. W. M. Mordey, and gives

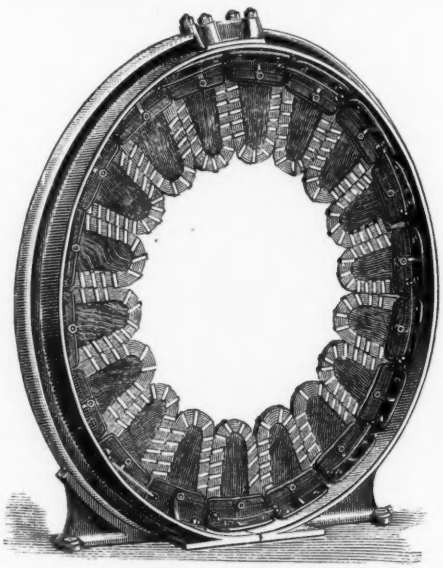


Fig. 1.—Armature of Alternator.

an output of 35,000 to 40,000 watts, the terminal potential difference being 2,000 volts. The speed is 650 revolutions per minute. Fig. 1 shows the armature, which is stationary, and consists of a number of coils of narrow copper ribbon, wound on cores of non-conducting material. Some detached coils are shown. Each coil is bolted at the broad end between two brackets, the ends of the conductor

being brought out through porcelain insulators. The brackets are then bolted to the gun-metal supporting ring, the coils being thus rigidly and securely held in position by metal supports, which in no part come between the poles, and are, in fact, almost entirely out of the magnetic field. By this means eddy currents are almost entirely avoided, any loss from this cause being still further reduced by the use of German silver for the brackets and bolts; the high resistance of this alloy preventing the generation of local currents of more than a very small amount. The gun-metal supporting ring, which is bolted to the bed-plate of the machine, is in two portions, being divided in a vertical diametrical line. These two parts, after having received the coils, are bolted together and to the bed-plate, the field magnet being first placed in position. It will be seen that this design provides ample facilities for repairs. It allows not only of single coils of the armature being quickly and easily removed and replaced, but also renders it easy to take out one half or the whole of the armature. We need not say that it is of the first importance in all electric lighting work, especially for central stations, that the machinery should be planned, not only with a view to the prevention of a breakdown, but also to permit of any necessary repairs being quickly carried out, and it will be seen that in this armature both these ends have been very satisfactorily attained.

The field magnet (fig. 2) cannot be said to bear any resemblance to any form of field magnet with which electric engineers are familiar. It consists of a single electro-magnet built up as follows:—A short cylinder of iron, through the axis of which the shaft passes, forms the core of the magnet, and is wound with the exciting coil. Against each end of this cylinder is placed a cast-iron piece of peculiar form, which will be best understood from fig. 2. Each casting has a number of horns or arms—nine in the machine illustrated—which radiate from the shaft and central part of the casting, and then bend over, forming nine pole pieces on each side of the armature. These horns on one side, as will be seen, approach within a very short distance of those on the other side of the armature, and in this very narrow polar gap or slit the armature is held, the entire field magnet revolving with the shaft on which it is mounted. The ends of the exciting coil are connected to "collector" rings on the shaft, which are shown to the right of the figure. These may be dispensed with, and the exciting coil as well as the armature may be stationary; but it is preferable, for mechanical reasons, to attach the winding to the rotating magnet. As will at once be seen, this form of field magnet is very simple. A single exciting coil suffices for a machine of any size, speed, or number of alternations. Besides its peculiarity of form, it differs from the usual arrangement in that it has poles of one sign only on each side of the armature; thus the magnetic leakage between adjacent poles on each side is absolutely *nil*, a condition widely different from that of machines having the usual arrangement of alternate polarities, in which the leakage is very considerable. By revolving the field magnet instead of the more delicate armature, safety and steadiness of running are secured, the heavy magnet acting as an excellent flywheel, and effectually neutralising any pulsations due to irregularity in the stroke of the engine. This is a point of some moment where slow speed engines are used. Further, as the parts revolving at the highest velocity are simple solid iron masses of the strongest description (not laminated), not subject to heating, and having no copper wire on or near to expand and fly out, the electrical and mechanical considerations which in ordinary dynamos usually renders low speed advisable do not here apply. The armature being stationary, the coils have to be supported only with a view to resisting the tangential drag of the field. This renders insulation a matter of comparative simplicity, and is of great importance in high tension work, such as this machine is primarily designed for.

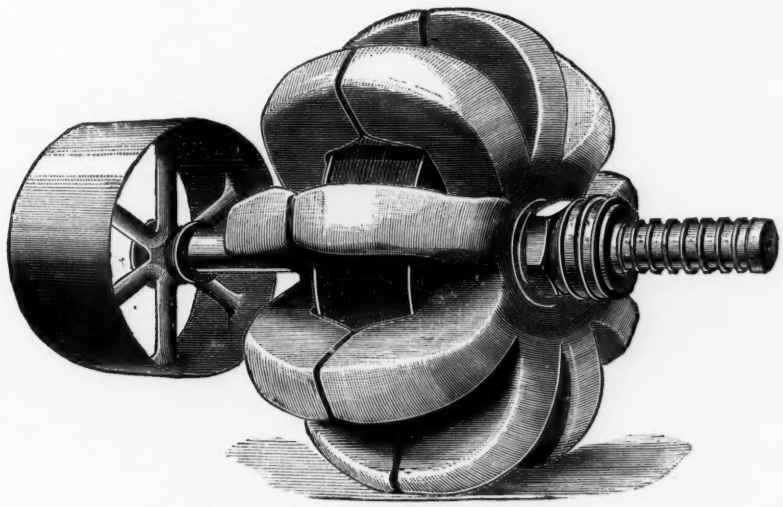


Fig. 2.—Field Magnet of Mordey Alternator.

The Mordey alternator is shown in its complete form in fig. 3. The field magnet is almost entirely hidden by sheet metal shields, which have for their object the prevention of air disturbance by the horns, which otherwise would act as the blades of a fan, and cause a perceptible waste of power. The fanning action is, however, permitted to a sufficient extent to ensure good ventilation and cool working. The armature terminals, which are not seen in the figure, are at the upper part of the supporting ring. The thrust bearing is adjustable longitudinally for the purpose of enabling the field to be placed exactly symmetrical with regard to the armature.

Fig. 4 shows also the little Victoria dynamo used as an exciter, and a small adjustable resistance, which is all that is required for regulation. The alternator is, in fact, very

nearly self-regulating in itself, as is shown by fig. 5, giving the characteristic of the machine throughout a range of 37,000 watts. From this curve, it is clear that practically

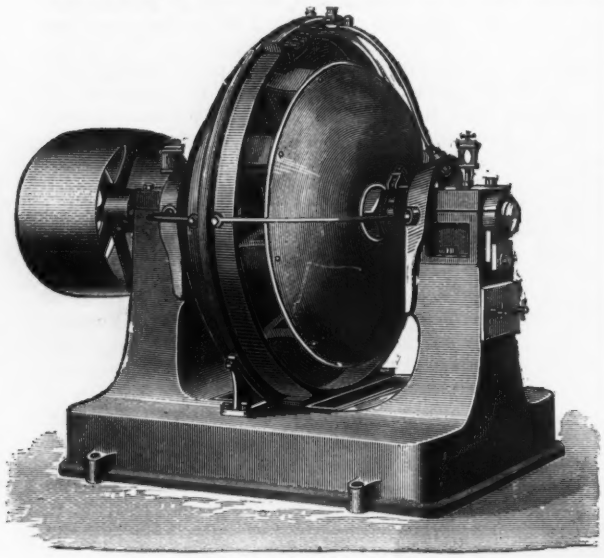


Fig. 3.—Mordey Alternator (Complete).

the whole of the load—or say 600 lamps—might safely be turned off without danger to any remaining lamps, and that probably a large proportion of the load, certainly 50 per

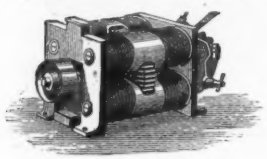


Fig. 4.

cent., could be turned off without attracting notice on the rest of the circuit. It is, therefore, not considered necessary or desirable, except under special circumstances, to provide other than a simple hand regulation at the dynamo

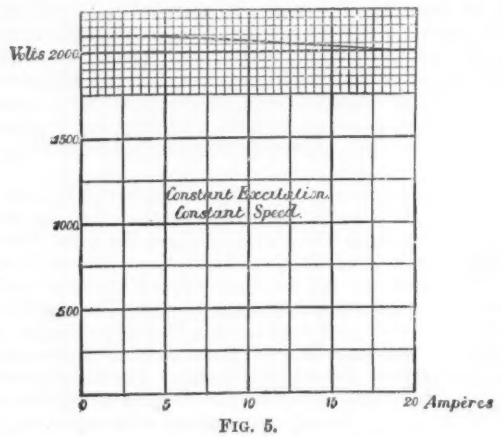


Fig. 5.

for the purpose of controlling the potential difference. Sudden and violent fluctuations of the lights are impossible with this machine, and an occasional touch of the resistance regulator, as the load comes on or off, meets all practical requirements. It is only in the case of machines whose potential curve is a rapidly falling one that it is necessary to resort to automatic control. There is no doubt that by avoiding the use of additional apparatus of this sort the chances of temporary interruption are reduced. By the arrangement of the armature coils it is easy to obtain various combinations if desired. This circumstance is made use of for simplifying the measurement of the potential. Instead of taking the reading across the terminals, which would necessitate the use of an electrometer, or a very high resistance voltmeter, an ordinary voltmeter, indicating to 100 or 150 volts, is placed across one of the coils. The machine is fitted with a special pair of voltmeter terminals for this purpose. We understand that this dynamo of 50 to 60 horse-power—the first of its type—was successfully built directly from the first design, without recourse to any preliminary experiment.

MR. LOCKYER ON THE EARTH'S MOVEMENTS.*

A STRANGE PUZZLE.

MESSRS. MACMILLAN have never been given to the publication of jocular scientific books, or we might explain this work as simply an elaborate jest. We cannot, on the other hand, suppose that, though published in all good faith as a serious work by them, it was intended as a jest by Mr. Lockyer, for he could not wilfully play off such a joke on his good friends, the publishers of *Nature*. Yet he cannot seriously regard this absurd production as a contribution to exact knowledge. It is true his "Elementary Lessons in Astronomy" contained some marvellous blunders, a few of the least preposterous of which were used in astronomical examinations at Trinity College, Cambridge, in the character of "awful examples," and in his "Primer of Astronomy" he made some still odder mistakes—as, for instance, in describing the stars which pass to the zenith of London, which never rise or set at all, as rising and setting "on a slant." But even this evidence that Mr. Lockyer might not be able to recognise the full absurdity of what he has brought out in the book before us does not prevent its being a strange puzzle. For surely some friend, were it only a well-taught schoolboy, might have been able to explain to him that a book which, with an elaborate air of condescension for the general reader, is utterly inaccurate, confusing, and misleading, should not be sent to the printers.

It chances that we have had to conduct examinations of students in astronomy, with the duty of determining who had done best and best deserved certificates or other rewards. In so doing we have sometimes felt appalled at the bewilderment of mind indicated in replies which related to matters explained with ample clearness in the text-books recommended by us, besides being most carefully, and as we had hoped simply, explained by ourselves in preparatory lectures. Well, we find again and again in Mr. Lockyer's book passages recalling answers of this saddening kind—saddening, yet sometimes so ludicrous that we have had to set down the papers we were examining to indulge in prolonged laughter at their absurdity.

Of course the whole book is not absurd. We come across

* "Outlines of Physiography. The Movements of the Earth." By Jos. N. Lockyer. London: Macmillan & Co.

explanations which are perfectly correct, being, in fact, only altered in a few words from an explanation given by Newcomb or Airy, or others who understood what they were explaining. Again, many of the illustrations are excellent, being, in fact, those provided to accompany correct explanations in books worth reading. But the trouble is that the reader, who is also a learner, can never be quite sure whether what he is reading is a correct and well-illustrated explanation borrowed from an able astronomer, or sheer nonsense which he should forget *quam celerrime*.

It is a duty which we owe to the honest student of astronomy to say so much as may keep him from wasting his time over this most remarkable production. We have not time to indicate all the passages which are incorrect or absurd; neither would it be fair to those writers whose correct statements have been repeated, to show how by eliminating such and such portions (all Mr. Lockyer's original work, we suspect) their good explanations would remain (little impaired by verbal changes) with their excellent accompanying illustrations.

The fairest course seems to be to give a few samples, taken absolutely unchanged from Mr. Lockyer's book (though many will find it hard to believe as much), to show that we have not exaggerated either the condescending tone of the work, or the utter inanity of the original (indeed, highly original) matter.

In the following passage, Mr. Lockyer opens his explanation of the apparent motion of the star-sphere:—

> Suppose that in the centre of a lecture-theatre a little globe were hung to represent the earth, the walls of the theatre and the people in it representing the heavens surrounding the earth. In such a case it is clear that the appearances presented would be the same whether the heavens moved round the earth, or the earth itself were endowed with motion. Let us, without making the assertion, assume that the earth does move. It is perfectly obvious, since the apparent motions of the heavens are so regular, that if that be so, she must move with wonderful constancy and regularity; she does not first move in one direction and at one inclination, and then at another; that would be very serious.
>
> If she rotates she must rotate round some imaginary line called an axis. This introduces an important consideration, because, whether the earth itself rotates on an axis, or the heavens move round the earth—and in the latter case the heavens must also move round an axis—in either case the motion must be an equable one, so that if the matter is thus limited to a constant axial rotation, or a constant revolution as it would be called in the case of the stars, several things will happen.

And so the explanation maunders on.

Here is another exquisite bit of "explanation":—

> If we assume the earth to rotate, we must carefully consider the varying conditions which are brought about by the different positions of an inhabitant of the earth under those circumstances. For instance, take the case of a man at the equator: he looks at things from an equatorial point of view, and in the rotation of the earth he plunges straight up and straight down.

Having in the fashion thus illustrated "explained" the apparent daily motion of the stars, Mr. Lockyer proceeds to explain their apparent diurnal motion. Here is the "explanation":—

> The same difficulty that was met with before is again encountered here—Is this movement of the sun among the stars a real or an apparent one? It is a question, however, which has been long since answered; and it can be very definitely stated, not only that the earth rotates on its axis in a period of twenty-four sidereal hours, but that it moves or revolves round the sun in a period which we call a year, and that it is this real movement which causes the apparent one of the sun among the stars. Let the reader take a top and spin it. Perhaps the top has a movement of progression as well as a movement of rotation, and it is in that way quite easy to see that the earth may rotate on its axis and revolve about the sun at one and the same time. And with a top of special construction its axis of rotation might be inclined so that its plane of rotation ceased to coincide with the plane of its motion of progression; still the two movements would go on, and in whatever position the top might be placed, its axis might be made to remain practically parallel to itself during its movements. We may now, then [oh, this *must* be a joke!], make the following statements:—*The earth revolves round the sun, and throughout the revolution the axis of rotation remains practically parallel to itself.* With regard to the latter part of this statement, it may be added that if this were not so—if the axis of the earth were subject to perpetual change of direction—the declinations of the stars would also be subject to constant change.

Finally, here is a passage from Mr. Lockyer's explanation of the aberration of the fixed stars:—

> In the case of the majority of the stars what we get is an ellipse, and in an ellipse we have certain differences which have to be taken into account, the last difference of all being that an infinitely elongated ellipse is a straight line, and it is found that from one particular point of the heavens where, in consequence of this aberrational motion, the orbits of the stars round their mean places are almost circular, we at last get to a point where the motion is simply an oscillation of the star backwards and forwards to and from its mean place; we are dealing, in fact, with that projection of the ellipse which takes the form of a straight line. When we deal with an ellipse we no longer talk of the radius, but of the semi-axis major, which is half the greatest length. The angle of aberration of which I have spoken only amounts to 20″·492, but though small, it is quite enough to prove that the earth does revolve, and that consequently the sun is the centre of the system to which the earth belongs, while it further tells us that the movement of the earth is slow compared with that of light.

Luckily no reader is likely to suppose he is really getting any explanations in such passages as these.

Gossip.

By RICHARD A. PROCTOR.

MESSRS. MAUNDER & KNOBEL desire to have it explained that the unnamed "Professor" referred to in "Gossip" for April did not appeal to them, as I had surmised and naturally (almost necessarily) believed—see p. 138—to announce (in a magazine which I was certain not to see and almost certain not to hear of) that I had not actively assisted his election to the Foreign Associateship of the Royal Astronomical Society. They did this thing of their own accord, not at the "Professor's" instigation at all. I willingly accept and publish their contradiction of my most natural mistake. They agree in speaking of this mistake as injurious; but without explaining how or why it was injurious, or whom it could possibly injure. It could not injure their *protégé*, he being past that; and though certainly it ought not to be pleasing to them to be supposed to be in correspondence with him, they had published more than that about themselves in the very letters on which I commented.

* * *

THE case was simply this—Messrs. Knobel & Maunder chose on partial information, amazingly misunderstood, to interfere in a matter in which they had no sort of concern, undertaking to contradict what I had not said and what a moment's reflection should assure any honest mind that I could not have intended to say. (Mr. Maunder admits in a letter from which, though marked "private," I am entitled in self-defence so far to quote, that when the complete correspondence, of which he and Mr. Knobel had seen only part, was before him, the impression he had formed of my meaning was "*proved* not to be the one I intended to convey"; and I maintain that even with the one letter he had seen my meaning should have been as clear as day to him and to Mr. Knobel.) For reasons best known to themselves they selected as a suitable place for the attempted injury to me a magazine which I never see, as they can

XUM

scarcely but know. Yet rather than attribute to them either (1) deliberate unfairness, or (2) wilful misrepresentation, or (3) gross blundering, or (4) inability to appreciate the rules which customarily guide men of honour, I generously took it for granted that they had been misled by a person known to have striven by untruths to injure another, and therefore unquestionably capable of untruth for his own benefit. It appears that I was altogether mistaken, so that one or other of the four explanations which alone remained available must be accepted. I am sorry for this. But my sorrow is by no means apologetic. It signifies rather my strong feeling that an apology is due to myself.

* * *

On the other hand, I am glad to find that I was not right in supposing that Mr. Fraser—(see Knowledge for June, pp. 186, 187)—had any thought of attributing unfairness, either to myself or to the author of the criticism to which he objected. I still think that Mr. Fraser was wrong in writing as he did, but I withdraw all that in my remarks about him went beyond that.

* * *

With regard to his heat theory of gravity, Mr. Fraser writes to me admitting that if the instantaneous action of gravity is proved the heat theory fails. But he asks whether the instantaneous action is proved? May not "the obstruction from meteoric gas and other matter in interplanetary space neutralise the acceleration which would be caused by the non-instantaneity of gravity"? I have never had much liking for the "may not" style of argument; but in presence of the absolute perfection with which all the planetary movements are explained, when gravity is assumed to be practically instantaneous, the suggestion that the various measurable departures from perfect agreement necessarily arising if gravity travels no faster than heat are all exactly corrected by the resistance of meteoric gas is too wild to be admitted for a moment. It would scarcely be less reasonable to suggest that gravity has no existence at all, but that the several planets are all kept in their proper paths by the resistances of meteoric gas and other matter in interplanetary space. The theory of gravity is regarded as established because it accounts in quantity and quality for all the movements of all the heavenly bodies. If all we could say of it was that possibly, were all the conditions known, gravity might be found to explain the planetary movements, the astronomy of to-day would be where astronomy was in the days before Copernicus.

* * *

Mr. Malet, the author of "Sunlight," has not written to me complaining about the criticism of *his* paradox—or, rather, his letters, though addressed to the Editor, were not forwarded to me (the said Editor) in my distant home, but to the gentleman who criticised Mr. Malet's speculations about light. From what I learn about Mr. Malet's letters, his light is wanting in sweetness.

Reviews.

In Pursuit of a Shadow. By A Lady Astronomer. (London: Trübner & Co.)—Among the English astronomers who undertook a journey to Russia to observe the total solar eclipse of August 19, 1887, appears to have been the authoress of the very pleasant, chatty, and agreeable little book before us. In company with another lady, she faced an experience of more or less toilsome travel of between two and three thousand miles into the heart of Russia, unhappily only to meet with disappointment, clouds practically hiding the whole phenomenon from the view of those who had come so far and toiled so bravely to view it. But if our "Lady Astronomer" was disappointed, her readers assuredly will not be, for it is long since we have seen in print so readable and unaffected an account of a journey through a comparatively strange country as she has given us. She tells of her voyage from Hull to Christiania, thence to Stockholm, on to St. Petersburg, and through Moscow to Pogost, where she was apparently the guest of Professor Bredichin; and whence, had the weather been propitious, the eclipse was to have been observed. After the disappointment of herself and her lady companion, she went on to see something of the world-famed fair of Nijni-Novgorod, and returned home *viâ* Smolensk, Warsaw, and Berlin. All this is told in the most delightfully chatty manner, without a trace of guide-book padding, irrelevant quotation, or any of the other devices by which modern works of travel are swollen into bulky books. We can cordially recommend this tiny volume.

Faustrestra: a Drama, with Other Poems and Essays. By Verestra, B.Sc. (London). (Clapham: T. Fox. 1887.) Whether the author of this ridiculous trash is simply irresponsible for his actions, or whether he is indulging in some form of "chaff" too esoteric for our comprehension, we cannot take upon ourselves to determine. An extract, taken absolutely at random from the so-called "Drama," may perhaps enable some more penetrating reader to divine which (if either) of these two hypotheses is correct:—

UNDINE.
Not to mention clear'y all the
Circumstances.

LADY JOAN.
I've lived all my
Life long in the sacred fame of
All the Virtues so to speak till. . . .

UNDINE.
Many were the escapades which
Took place in the misty shadows
Of its aisles. I've heard about them.

LADY JOAN.
Since you are so very learned
On the subject may I ask from
Whom you heard about these mighty
Escapades.

MADAM ANYBODY.
We knew about them.
Walls have ears, you know,—You humbugged
Many—not us, though.

LADY JOAN.
It seems you
Know more of my history than
I myself do, so you'd better
Tell it, or proceed to tell your
Own ones.

The author seems to lapse into something approaching temporary sanity in a concluding Essay on the Senses.

Granites, and our Granite Industries. By Geo. F. Harris, F.G.S. (London: Crosby Lockwood & Son. 1888.)—Within the space occupied by 134 pages Mr. Harris has contrived to convey a very large amount of information on the subject to which his volume is devoted. The geologist will here find an exposition of the latest theories of the origin of granite, and the petrographer full details of its lithological structure; while all interested in it, in its commercial and economical aspect, may learn whence it is obtained, and how quarried and worked. A description of the method of turning it in the lathe, and of the other mechanical processes by whose aid it is wrought, form the subject of the eleventh chapter. Fifteen woodcuts illustrate the text, and there is a very full index.

History of South Africa (1486–1691). By GEORGE MCCALL THEAL. (London: Swan Sonnenschein & Co. 1888.)—Every one who wishes to understand the existing condition of our South African colonies will derive valuable assistance from Mr. Theal's exhaustive history, of which the first instalment lies before us. Beginning with the original discovery of the Cape of Good Hope by Bartholomew Dias in 1486, he brings his story down to the time of the rule of Commander (eventually Governor) Van der Stel, during whose tenure of office so considerable an emigration of the French Huguenots occurred: the narrative terminating with the year 1691. What the rule of the Dutch East India Company in South Africa was may be well realised from the vivid description given by our author of the occurrences during the period covered by the present volume. It obviously embodies the results of a very large amount of research indeed, and will well repay perusal.

Facts about Ireland: a Curve-history of Recent Years. By ALEX. B. MCDOWALL, M.A. (London: Edw. Stanford. 1888.)—In this little book Mr. McDowall has applied the system of plotting curves, now so generally employed for showing meteorological data graphically, to the exhibition of a variety of Irish statistics. As a rule, the years form the abscissæ and the quantities dealt with the ordinates of his curves, and in this fashion he shows the fluctuations in agriculture, education, crime, intemperance, emigration, bank deposits, and the like. The idea of thus popularising a mass of numerical data is not a bad one.

Disease: its Prevention and Cure by Simple Natural Means, &c. By CHAS. G. GODFREY. (London: H. Grevel & Co. 1888.)—*The Increase of Cancer in England.* By JOHN FRANCIS CHURCHILL, M.D. (London: David Stott.)—If Dr. Churchill's statistics are trustworthy, a most alarming increase of cancer is in progress in this country, an increase which he traces to the reckless use in modern therapeutics of oxidisable phosphorous compounds, whose employment he deprecates in the strongest manner. His remedy must be sought in his book itself. Mr. Godfrey proposes to cure cancer and a variety of other diseases by the use of dry food, by common salt, and by a very large diminution of the amount of liquid consumed. It is piteous to read of the death of his only daughter after he had, as he alleges, cured her of blindness (!) by his peculiar method of treatment.

A Fight with Distances. By J. J. AUBERTIN. (Kegan Paul, Trench, & Co.)—The "distances" with which our restless author fought within the narrow space of ten months cover well-nigh the North American Continent and the chief West Indian islands. He brings himself perilously near Matthew Arnold's crowd of hurrying men "who see all sights from pole to pole, yet never once possess their soul before they die." The book has the defects and merits of Mr. Aubertin's previous records of like scampers in Mexico and South Africa, but as he always adds to our store of information, and that in good-tempered, unaffected talk, we forgive the intrusion of peddling details, and commend the book to all lovers of travel-records, especially to any who may be contemplating a similar trip.

Lucian's Dialogues. Translated by HOWARD WILLIAMS. (Bell & Sons.)—Instead of adding to the over-translated among the ancients, Mr. Williams has laid us under obligation by this admirable and much-needed translation of the more important and best-known works of the great "Pantagruelist of Samosata." The simplicity, raciness, wit and common sense, which are the features of the Dialogues of the Gods and of the Dead, have not vanished in the process of transfer from Greek to English, and we hope that the present work will meet with success that shall encourage Mr. Williams to give us another volume. The translations are prefaced by an admirably full and clear introduction, and enriched with abundant notes.

Memory, What it is, and How to improve it. By DAVID KAY, F.R.G.S. (London: Kegan Paul, Trench, & Co. 1888.)—Mr. Kay, having produced a work of high interest, which affords evidence of extensive reading and research, and abounds in a wealth of illustration, has made it almost unreadable by the simple expedient of crowding almost every page with footnotes! Anything more wearisome and distracting we scarcely ever remember to have met with, and the reader's irritation becomes greater as he often finds the *ipsissima verba* of the text repeated in smaller type below. Of course it is possible to skip these annotations, and any one who will resolutely do so will find Mr. Kay's volume interesting and instructive in a high degree; but the initial temptation to refer to them is as great as is the annoyance incident on yielding to it. When the work before us reaches its second edition, we would venture to suggest that such evidence of its author's erudition as quotations may be held to afford should be relegated to an appendix, and not suffered to confuse the reader as they do in their present position. With this emendation, we could cordially recommend a book from which much is to be learned of enduring value.

Game, Shore, and Water Birds of India. By Colonel A. LE MESURIER, R.E. (London: W. Thacker & Co. 1888.)—Compact in form, excellent in method and arrangement, and—as far as we have been able to test it—rigidly accurate in details, Colonel Le Mesurier's book should become the vade-mecum of every sportsman and naturalist whom duty or pleasure may compel to visit India. The numerous and excellent illustrations (of which no less than 121 appear in 148 pages) render the identification of genera a matter of great simplicity.

Restful Work for Youthful Hands. By S. F. A. CAULFEILD. (London: Griffith, Farran, Okeden, & Welsh. 1888.)—We grieve to have to utter anything in disparagement of a little volume written with the laudable object of showing how children in the upper and middle ranks of life may profitably employ their spare time in benefiting others. It is, however, rather with Mrs. Caulfeild's manner than with her matter that we have any quarrel. The fact is that texts and goody-goodiness are somewhat too obtrusively introduced, and there can be no doubt that the work would gain by their excision. Our own experience is that a child like "Rose" who is always being preached and quoted at learns at last to loathe the source of the quotations rained upon her devoted head, and, as soon as she is emancipated from the amiable and zealous fanatics who make her a target for discharging the contents of the Scriptures at, rushes into the very extremity of worldliness. A judicious parent might, however, teach her daughter many valuable lessons from Mrs. Caulfeild's small book if she would merely suppress such parts of it as labour "to improve the occasion."

Notes on Shakspere's "King Henry V." By T. DUFF-BARNETT. (Bell & Sons.)—Just the thing for the teacher. Immersed in teaching, and without the time needed to digest and arrange and tabulate the information he has been giving to his class, here he has to his hand the points which most of all require careful attention, and concentrated attention if his boys are to do well at their examinations. Mr. Barnett is a practical teacher, and has shown as much discretion in what he has omitted as in what he has inserted. There is nothing in his book that a student of the play

XUM

ought to fail to notice; and he will look in vain for the niggling "readings" and the often ill-rewarded "see page so-and-so" which encumber the notes of editions even so good as those of the Clarendon Press. Mr. Barnett's book will be invaluable for the local and army examinations.

Primer of German Literature. By Isabel T. Lublin, F.R.Hist.S. (London: Swan Sonnenschein, Lowrey, & Co. 1888.)—Miss Lublin's work is confined to the belles-lettres, and wholly excludes the enormous mass of scientific literature—mental, moral, and physical—so eminently characteristic of the German race. Beginning with the earliest records, our authoress gives, in the first portion of her book, a *précis* of every work whose fame has descended to the present day. The latter half of the work consists of a series of succinct biographies of all those who have enriched German literature, with lists of the works by which they have been chiefly distinguished. The very comprehensive character of the volume may be gathered from the fact that it opens with Ulphilas (*circa* A.D. 340), and concludes with Von Ranke, who died in 1886.

The Vision of a Passion, and other Poems. By Thomas Folliott. (London: Wyman & Sons. 1887.)—The poem from which Mr. Folliott's book takes its title is in blank verse, and is not without a certain amount of grace in places, albeit falling short of that excellence which can alone render such numbers attractive. Of his versified pieces, "Alice" has a needlessly dismal ending. We would invite Mr. Folliott's attention to the fact that "streaming far" does *not* rhyme with "gleaming are," as he appears to imagine, on p. 56.

Prosperity or Pauperism? Physical, Industrial, and Technical Training. Edited by the Earl of Meath. (London: Longmans, Green, & Co. 1888.)—Having once admitted, and acted on, the Socialistic principle that it is the duty of the State to "educate our masters," the nature and character of such education become a matter of vital national importance. The net result of the existing system has been to unfit the children of the labouring classes for their own station, without rendering them fit for any other—to dissatisfy them with manual labour, and to tempt them to crowd the ranks of clerks and pupil teachers, under the preposterous notion that handicraft is vulgar and clerical work "genteel." To show the enormous advantage which must accrue at once to the individual, and to the nation at large, Lord Meath has collected a series of essays, reports, and speeches by men of the most diverse intellectual calibre—from Lord Hartington down to Mr. Mundella. The thoughtful reader will readily separate the wheat from the chaff in this heterogeneous compilation, and will probably come to the conclusion that for lads to learn to make a dove-tail joint, or in agricultural districts to be taught something of the nature of soils and manures, and for girls to learn to cook a plain joint and scrub a floor, would be almost infinitely better than for them to be crammed with the French and algebra which now so preposterously form a part of our Board School curriculum.

Raygarth's Gladys and other Poems. By James Saunders. (London: Thomas Laurie. 1888.)—Mr. Saunders is scarcely at his best in the blank verse of the poem which gives its title to this collection of his pieces. Now and again he wanders into true poetry. His small volume is at least up to the average of any of those of fugitive verse which have recently been issued.

The Way to Fortune. (London: T. Fisher Unwin. 1888.)—In a series of aphorisms and anecdotes, strung together in fifty short essays, the anonymous author or compiler of this little book really does contrive to give some very sound and useful advice to the youthful aspirant to fame and fortune. His work may be regarded as "Poor Richard," amplified and extended, and would form a far from useless present to a lad starting in life.

Children's Services, with Hymns and Songs. Edited by the Rev. A. W. Oxford, M.A. (London: T. Fisher Unwin. 1888.)—These short, bright, simple little services should prove a blessing to unnumbered hundreds of miserable children who are compelled, Sunday after Sunday, to sit wearily through the battology of the three rolled into one with which the Church of England hebdomadally afflicts its attendants.

THE FACE OF THE SKY FOR AUGUST.

By F.R.A.S.

THE spotless sun is absolutely devoid of interest as a telescopic object. On the evening of August 7 there will be a very small eclipse of the sun, its magnitude even at the time of greatest phase being only 0·013 of the sun's diameter. It begins at Greenwich at 6h. 48·8m. P.M., the greatest phase happens at 6h. 57·7m. P.M., and by 7h. 6 5m. P.M. the moon has entirely cleared the sun's disc. The first contact happens at 32° towards the West from the apparent top of the sun, and the last contact 13° towards the West. The sun sets at 7h. 36m. Map viii. of "The Stars in their Seasons" shows the aspect of the August night sky. Minima of the curious variable star Algol ("The Stars in their Seasons," map xii.) will occur on August 2, at 11h. 13m. P.M., on the 5th at 8h. 2m. P.M., on the 22nd 55m. after midnight, and on the 25th at 9h. 44m. P.M.; as also on other occasions less favourable for the amateur observer. Mercury is a morning star during the first three weeks, but comes into superior conjunction with the sun at 1h. A.M. on the 24th. At the beginning of the month he may be detected in the E.N.E. before sunrise. Venus is an evening star, but is an insignificant object, and hardly worth looking for. Besides, she is close to the horizon at sunset. She will be some two diameters of the sun north of Regulus ("The Stars in their Seasons," map iv.) on the 11th. Mars is now receding from the earth, and looks like a mere big red star in the telescope. He must be looked for the moment it is dusk. Jupiter is worse placed still; he may be picked up as soon as he is visible in the twilight to the west of β Scorpii ("The Stars in their Seasons," map vii.). The phenomena of his satellites, which, the weather being clear, will be certainly visible, are: The egress of the shadow of satellite i. at 9h. 15m. P.M. on the 3rd; the ingress of the shadow of the same satellite at 8h. 58m. P.M. on the 10th; the reappearance from eclipse of satellite i. itself at 8h. 23m. 13s. P.M. on the 11th; the ingress of the shadow of satellite ii. at 8h. 10m. P.M. on the 18th; followed by that of the shadow of satellite iii. at 8h. 50m. P.M. Then on the 25th the transit of satellite ii. will begin at 8h. 6m. P.M.; on the 26th the egress of satellite i. will happen at 8h. 14m. P.M., and, finally, on the 27th satellite ii. will reappear from eclipse at 7h. 58m. 27s. P.M. Saturn, Uranus, and Neptune are all invisible. Watch should be kept on the 9th, 10th, and 11th for the shower of shooting stars, through which the earth annually passes, and which, anciently called "St. Lawrence's tears," are now known to astronomers as the Perseids, from the fact that they appear to start from the constellation Perseus ("The Stars in their Seasons," map xii.). The moon will be new at 6h. 21·0m. in the evening on August 7, enter her first quarter at 4h. 44·1m. P.M. on the 14th, be full at 4h. 20·3m. P.M. on the 21st, and enter her last quarter at 2h. 18·3m. in the afternoon on the 29th. Two stars only will be occulted by the moon before midnight during the present month. The first is ψ^3 Aquarii of the 5th magnitude, which will disappear at 9h. 46m. P.M. on the 22nd at the moon's bright limb, at an angle of 29° from her vertex; reappearing at her dark limb at 10h. 30m. P.M. at an angle from her vertex of 320°. The second occultation occurs on the night of the 26th, when ξ^2 Ceti, a 4th magnitude star, will disappear at the bright limb of the moon at 11h. 20m. at an angle from her vertex of 98°. It will reappear at her dark limb 22 minutes after midnight at a vertical angle of 238°. When our notes open the moon is in Taurus ("The Seasons Pictured," plate xxiii.). As she traverses this constellation she arrives at 10h. P.M. on the 3rd at the extreme north-western boundary of Orion. It only takes her some 9½ hours to cross this, and at 7h. 30m. the next morning she emerges in Gemini ("The Seasons Pictured,"

plate xxiv.). Her journey through Gemini is completed by 5h. 30m. A.M. on the 6th, at which hour she enters Cancer. She quits Cancer for Leo at 7h. P.M. on the 7th, and Leo in turn for Virgo at 9h. A.M. on the 10th ("The Seasons Pictured," plate xxv.). She remains in Virgo until 1h. 30m. P.M. on the 13th, when she crosses the boundary into Libra ("The Seasons Pictured," plate xxvi.). In the course of her journey through Libra she arrives at 6h. A.M. on the 15th at the western edge of the narrow northern spike of Scorpio, when by 3 o'clock the same afternoon she has crossed this it is to come out in Ophiuchus, a constellation which she leaves for Sagittarius at 4h. A.M. on the 17th. By 10h. A.M. on the 19th she has traversed Sagittarius and entered Capricornus ("The Seasons Pictured," plate xxi.). She leaves Capricornus for Aquarius at 8h. 30m. A.M. on the 21st. She is travelling over Aquarius until 11h. A.M. on the 23rd, and she enters Pisces ("The Seasons Pictured," plate xxii.). Journeying across Pisces, she at 4h. A.M. on the 24th plunges into a portion of Cetus, and continues in that constellation until 1h. 30m. P.M. on the 25th, when she emerges in Pisces again, only, however, to re-enter Cetus 10h. later. When she quits Cetus for the second time at 5h. A.M. on the 27th she comes out in Aries ("The Seasons Pictured," plate xxiii.). She remains in Aries until 5h. 30m. A.M. on the 28th, and then passes into Taurus, travelling through which, as at the beginning of the month, she reaches the northern prolongation of Orion at 6h. A.M. on the 31st. At 5 o'clock that afternoon her journey over this is complete, and she quits Orion for Gemini. There we leave her.

Our Whist Column.

By "Five of Clubs."

MATHEWS ON WHIST—*concluded.*

Playing to the Score.

YOU should not give up the certainty of the odd trick for an even chance of making two by tricks, nor that of making or saving a point for an even chance of making an extra trick. And conversely you should risk a finesse giving you an even chance of preventing your adversaries from getting the odd trick or from making or saving a point. [In Mathews reference is made to the points at long whist, and the wording is obscure: the strategic principle is the same both for short whist and long whist.]

When at three, with two honours, note the adversaries' score and consider whether there is a probability that they may win the game by tricks, or make a point, even though your partner should hold a third honour. If there is, you should conceal your strength in honours as long as possible, as a knowledge of it would give the adversaries a decided advantage against you in playing for tricks.

To explain what is meant by playing to the score or to points, consider the following case:—

A has the two lowest trumps, and two forcing cards with the lead. The two best trumps are known to be with the adversaries, but it is uncertain whether they are divided or both in the same hand. Nine tricks have been turned. *Query*: What should A play? *Answer*: This can only be decided by considering the score, and inquiring whether it justifies hazarding two tricks for one or not. It should be obvious that before the score is much advanced it would be quite wrong for A to play a trump, because by so doing he manifestly ventures two tricks for one: he should therefore secure two tricks by playing a forcing card. But suppose A-B are at the score of two, and that they have won six tricks, Y-Z not having reached the score of four: then as obviously A should play the trump, because if the other trumps are divided A wins three tricks and the game, and if they are not divided A-B remain at the score of two: the even chance of winning the game is better than the certainty of reaching the score of four. If the adversaries are at the score of four, A should of course not lead a trump, for he is certain to save the game if he leads a forcing card, and there is an even chance of his losing it if he leads a trump.

The following critical stroke decided one of the most material rubbers [as to the amount of money depending on it] ever played, and is recommended to the attentive study even of proficients:—

The score was nine-all [corresponding to four-all at short whist]. A had won six tricks, and remained with knave and a small trump, and two diamonds, with the lead. Y, his left-hand adversary, held the queen and ten of trumps and two clubs. B, A's partner, had two small trumps and two diamonds. Z, the last player, held the ace of trumps and a small one, a club, and a heart. A led a diamond, which was passed by Y, and was to be won by Z. *Query*: How is Z to play to make it possible to win the odd trick? *Answer*: Z saw it was impossible to win the odd trick unless his partner held either the two best trumps or the first and third, with a successful finesse [that is, the second-best with A]. He therefore trumped with the Ace, and led the small one, and Y finessing the Ten, Y-Z won the game. [By taking the trick with the Ace, Z made his partner's trumps the best and third best, which before the Ace was played were the second and fourth best. Clearly had he retained the Ace only one round of trumps could have been taken out, and one trick must go to the enemy, even though Y held the two best trumps after the Ace. It will be noticed, of course, that Z's play would have been quite wrong had the score been other than it was. For by ruffing with the small trump, Z would make sure of three tricks out of the four last, whereas by playing the Ace he left it more than an even chance that Y-Z would make but two tricks. Since, however, three tricks would be worth no more to Y-Z than two, when all four were wanted to save the game, he won the game for himself and partner by his correct strategy in playing to the score.]

Some Points of Strategy.

The difficulty of Whist does not consist in playing good cards to advantage, for Aces and Kings will make tricks, and no skill can make a Ten win a Knave. But there are hands which frequently occur when skilful players win where bunglers lose points, and, except where the cards run very high, it is on the playing of such hands that success depends.

For example, suppose a player holds Ace or King and three other trumps, a tierce-major with others of a plain suit, and a probable trick [that is, a probable re-entering card] in a third suit, the player's plan here should be to remain either with the last trump, or with the last but one, with the lead. To accomplish this he must not win the second trick with his commanding card, but reserve that card for the third. Nothing, then, but five trumps in one hand can probably prevent his establishing his long suit. For where he finds but four trumps against him in one hand, and the fourth or last left of those adverse trumps is against him, he forces it out with his long suit, and then the thirteenth trump brings in his suit again, which without the lead after the third round of trumps would be impossible.

[The "probable trick in a third suit" is required to give the trump leader a fair chance of leading a third round of trumps, should his partner be unable to lead trumps again. Mathews gives as illustrative cases, to make his "maxim"—as he calls it—more clearly understood, a series beginning with the same case precisely which has just been dealt with. The others are as follows]:—

A with a strong suit headed by the tierce-major, a probable trick in a third suit, holds Ace, King, and two small trumps. If the adversaries lead trumps he should not win the first trick, even if last player. By passing, he remains after the second round with the best card for the third, and establishes his suit, even though the best trump remains against him, unless there were five trumps in one hand originally.

With a similar hand and Ace, Queen, and two small trumps, do not win the Knave led on your left hand, but let trumps be led again. You then take out the third round, and remain as in the case last considered.

[The following special case is worth noticing]:—

A remains with the best trump (say the Ten) and a small one, with some losing cards, B, his partner, having to A's knowledge the second best (say the Nine) with some winning cards, the adversaries having some winning cards of the other two suits. A is forced. *Query*: How should he play? *Answer*: A should ruff with his best, and lead out his small trump; he thus puts the lead in his partner's hand, enabling him to make his winning cards, while those of the adversaries are rendered useless. This mode of play would sometimes be right, even when it was not certain whether the second-best trump was in partner's or an adversary's hand; but the fine player alone can determine the correct play under such conditions.

Judgment is often required in taking the penalties of a revoke. Before the score is advanced, if the party revoking has won nine tricks, the least consideration will show that the adversaries should take three of them; for if they add to their own score they still leave the odd trick to the enemy. But if the revoking party is at the score of three, it is better for the adversary to score three points, as the odd trick leaves the former at four, which is in every respect a worse point than three. [In the original the reference is to long whist, in which perhaps the privilege of the "call" made the score of eight preferable to the score of nine; but in short whist sound players prefer the score of four, for the reason aptly indicated by Mr. Bentinck, that the possession of three honours does not *absolutely* prevent the winning of the odd trick.] On other occasions it is only necessary to calculate how the different

XUM

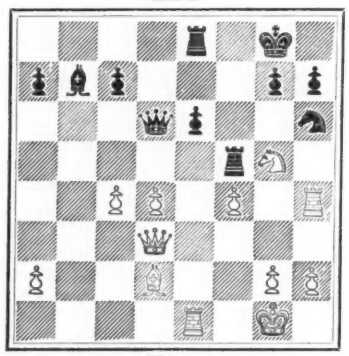
scores will remain after each mode of taking the penalty, and to select that which gives the best result, never losing sight of the points of the game, noticing—that is, that you are to score one or three yourself, or prevent your adversary from so doing.

Our Chess Column.

BY "MEPHISTO."

A VERY interesting position in a game, wherein Black had given the odds of Pawn and two moves to White :—

GUNSBERG.
BLACK.



WHITE.
E. SELLON.

White played
P to Kt4
An excellent move, which ought to win, as Black cannot at present move his Rook.
Black replied

	Q to B3
P to Q5	Q to Kt3 (ch)
B to K3	Q to R4
B to Q2	

Instead of this move, White might have played R to K2 without any fear of complications, leaving Black's position as before.

	Q to Kt3 (ch)
K to Bsq	

Played in the hope of preventing any further dilatory moves by the Black Queen.

	R × Kt

This move came like a bright gleam of hope in a lost position. If White replies P × R, then Black plays R to Bsq (ch), following this up by Q to B7 (ch); and then, if White plays K to Rsq by P × P, &c., with a fair attack—

B to K3	

A very plausible move, and much superior to P × R.

	R × QP
Another timely saving move.	
P × R	B to R3

The third move of the entire combination, winning another piece.

B × Q	B × Q (ch)
K to B2	RP × B

Black ultimately won.

An Algaier Gambit, played a few days ago between two strong players, produced the following very pretty game :—

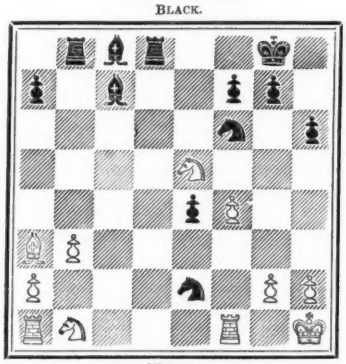
WHITE. A.	BLACK. B.
1. P to K4	1. P to K4
2. P to KB4	2. P × P
3. Kt to KB3	3. P to KKt4
4. P to KR4	4. P to Kt5
5. Kt to Kt5	5. P to KR3
6. Kt × P	6. K × Kt
7. P to Q4	7. P to Q4
8. B × P	8. Kt to B3
9. B to K5	9. B to Kt2
10. Kt to B3	10. P × P
11. B to B4 (ch)	11. K to Kt3
12. Q to K2	12. P to KR4
This is seldom a good move in this opening. R to Bsq is better.	
13. Kt × P	13. Kt × Kt

This is a very natural move, but White surprised his opponent very much by announcing mate in six moves. This was given as follows :—

14. Q × Kt (ch)	14. B to B4
15. Q × B (ch)!	15. K × B
16. Castles (ch)	16. K to Kt3
17. B to Q3 (ch)	17. K to R3
18. B to B4 (ch), and mates next move.	

A pretty end-game played by Herr D. van Foreest, of Amsterdam :—

D. VAN FOREEST.
BLACK.



WHITE.
AMATEUR.

It was White's turn to move, and he played—

1. Kt to B6	1. B to Kt2
2. Kt × QR	2. Kt to Kt5
3. B to B5	

Black threatened mate by Kt to B7 (ch), followed by R to Q8 (ch)

	3. P to K6.

Still threatening the same mate

4. P to KR3.	

Now Black mated in four moves by

	4. R to Q8
5. Kt to B3	5. Kt to B7 (ch)
6. K to R2	6. B × P (ch)
7. P to Kt3	7. B × P mate.

WE have received from Mr. Clement L. Wragge, F.R.G.S., of Brisbane, the Government meteorologist of Queensland, two of his elaborate daily charts of the weather prevailing over the entire Australian Continent and New Zealand. Scientific meteorologists and geographers may be glad to know that the Postmaster-General for Queensland has fixed the annual subscription for these most instructive maps at 2*l.* 2*s.* (payable in advance) post free to any part of the British Empire.

CONTENTS OF No. 33.

	PAGE
Man's Religion the Expression of his Knowledge	193
The Religion of the Ancient Britons.—II.	193
English Pronunciation	196
The Duration of our Coal Supply. By W. Mattieu Williams	198
Easy Study in the Differential Calculus	199
Thackeray and the *Saturday Review*	202
British and Irish Fairies. By "Stella Occidens" (Mary Proctor)	202
Bacon's Own Cipher	204
An Undecipherable Cipher. By Richard A. Proctor	205
Simple Mechanical Tricks	206
Evolution of Language. By Ada S. Ballin	207
Ink *versus* Writing Fluid	209
Sir Wm. Herschel's Surveys of the Heavens	210
Gossip. By Richard A. Proctor	211
Reviews	211
Our Whist Column. By "Five of Clubs"	214
The Face of the Sky for July. By F.R.A.S.	215
Our Chess Column. By "Mephisto"	215

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